

COAL AGE

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Fine Anthracite an Intruder

IN THE domestic field fine anthracite is an intruder. It has to force every inch of its way. Its use as an exclusive fuel demands special equipment. Consequently it has more reason than large coal to be kept up to the best standard that can be continuously and broadly maintained. The prejudices are against the fuel, and consequently it might pay perhaps to raise the standards for its preparation. We do not say that we know it would be advisable, only that it *might* be profitable to do so.

Innovators easily are discouraged and easily do they discourage others. For instance, an ex-treasurer of an anthracite company had a heater that would burn No. 1 buckwheat. He got a bad brand of that fuel, and he promptly concluded that pea was the fuel for him. Doubtless he could burn the finer coal satisfactorily, but he no longer attempts it. Had the buckwheat he got been cleaner he would have been burning that size yet. His neighbors are purchasing it and apparently find that the use of it pays.

Clearly then, one delivery of bad buckwheat, no matter whence it comes, can do immense injury to the whole business. It creates an unfavorable attitude to that size, no matter where produced. It hinders the public from equipping itself to burn fine anthracite. The injury wrought by one substandard delivery is incalculable. The honorable producer suffers with the dishonorable and suffers longer, for he is striving to live on in the business rather than to make a big stake and withdraw.

Localism of Consulting Engineers

MUCH care should be exercised in the choice of a consulting engineer. A man in a given locality is the best judge, as a rule, of a local property. He knows the market, the standing of the coal in public estimation, the value of coal lands, the prospects of trouble in operation, and if he is freed of favoritism and prejudice he can make a good report. Unfortunately, that is rarely the condition of his mind. He may steel himself to render a fair appraisal, but circumstances are likely to be against him.

Send him, however, to another field and he is prone to make other false judgments. He may go from a high-volatile to a low-volatile coal, and seeing the coal is of a somber hue and breaks up fine he overlooks its sterling qualities. He has been catering all his life to a market demanding lump coal, prejudiced against coal that does not glisten and that has few stokers to absorb the slack. Consequently he returns an unfavorable report.

Perhaps he finds that the coal is not of the bed which has attained a fair name in the past but is in one of lower quality. He forgets that the other bed

is worked out, that the market has become well content to accept the coal from the new bed, now that it has no competition. He exploits his one piece of geological knowledge but serves only to mislead his client.

It takes a broad knowledge to make a good consulting engineer, and some humility. If a certain coal is selling he must still that desire of his to say that by all the rules of the selling game it ought not to sell. It may be well if he should find the cost of mining and freight to be high to inquire whether that is acting as a deterrent to business; if it is low he will still do well to ask whether the market is satisfied to buy it. The coal may clinker on the grate. It may have a particularly strong rival in the marketing field. Selling coal is not all geology, as coal men know, but this fact is not always appreciated by geologically minded engineers from other regions than that being investigated.

So much for a producing region. The consulting engineer for a region not yet producing or only just beginning to produce needs still more to be a superman.

Every Man Has His Mental Twist

MOST of us are victims of mental habit and our employees are no more free from that twist of mind than others. It is a wise man who sums up correctly the natural bent of those whose services he is employing. Most non-technical mining men have the direction of human effort as their major qualification. To place their attention on anything else requires earnest and even painful mental effort, and most of them pursue the line of least resistance and avoid such cerebrations.

Many men would sooner wander around a mine than write a letter or cast up a line of figures to find out what their coal cost may be on any given day. Others there are who would write their letters and calculate their costs and distribute them before they would enter the mine to make an examination. They would find a hundred reasons to justify their action, and their reasoning would not be easily controverted.

Some men have an actual abhorrence of machinery. In earlier years they did not use it. To coddle a troublesome machine, to wrestle with the problems involved in making a pump run steadily are alien and displeasing jobs. They would sooner inquire why one man is a slow worker and why a certain miner loads dirty coal—two important matters, to be sure, and needing attention, but still, not sometimes as important as some mechanical matter which may keep many men or the whole mine idle. In fact a disinclination to busy himself with mechanical details has kept many a man from proving a good superintendent and has been the cause why many a mechanical device has not proved effective or efficient.

Foremen have learned by long experience that idle haulage men mean high cost of coal and pre-
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demotion. In consequence, they are little disposed to hold the transportation system standing for a while even if thereby they can keep a large number of day-wage men on a mechanical shovel from loafing on the company's time. As a result the shovel has failed to do its duty.

In fact every innovation has met with silent resistance from men whose thinking processes could not adapt themselves to it. Several years are often needed to fit the superintendent or the foreman to his new environment. He has to be compelled for a while to do violence to his inclinations. He has to overcome his subconscious tendency to do everything as if the old conditions still ruled, to argue all problems as if the old difficulties and not new ones had to be met.

The successful manager will sense this opposition, none the less because it is not vocal or obvious. If he hopes to make an important change in a subordinate's habit he will have to be a skillful advocate and follow his reasoning with pressure. That cannot be done at long range or without a knowledge of the idiosyncracies of the man in subordinate charge. Several visits to the mine are necessary and perhaps some changes in personnel.

It is quite easy usually when on the ground to find out if some primary duties are being neglected in favor of secondary duties that might be permitted to wait. Sometimes it is better not to try to teach "an old dog new tricks," but to rearrange matters so that the responsibility for new duties shall fall either on shoulders of men more progressive or of those whose habits fit more closely with the new need.

Our Shattered Faith in Water

ANYONE who has sprinkled wet coal on a fire knows that the water has little effect compared with that of the coal that goes with it. The glowing coals beneath the wet slack are not quenched, they are fed with new combustible.

We are losing faith in water as an immunizing agent in preventing explosions. Saturated air certainly has no appreciable effect in preventing an explosion so long as the dust is dry. By this is meant that to satisfy with water vapor the air entering a mine will in no way deter the extension of a dust explosion.

Saturated air and thorough sprinkling will assist in making the mine safe. It will certainly tend to keep down the dust, and it is likely that it will keep the fallen coal in roadways from degradation. Probably a mine kept saturated will have granular rather than decrepitated coal in the passageways. We do not know why some mines explode violently and others do not have explosions but it is possible that in some the coal tends in itself to comminute and in other mines it does not become fine except as a result of the crushing and grinding processes of traffic and travel. There are other reasons of course, as the Bureau of Mines has demonstrated, but this seems quite a probable reason why some dusts explode readily and others do not.

If coal under water or in saturated air is protected from deterioration it may be prevented thereby from becoming dangerous. Furthermore if some is ground and some is still granular the granules will cover the dust and make for protection. It has even been suggested that coarse coal may assist in smothering an explosion.

We might suggest that a layer of fresh fallen un-

broken coal may be a protection rather than a menace. That sounds and perhaps is a dangerous doctrine, but it may be worthy of consideration. The point arises: "Are our mines safer than they would be if we had less fallen coal in our roadways?" Do they not cover fine coal with granular and so work out an immunity from a violent explosion?

Dangerous as this question seems to be it must be faced. If we are going to build coaltight cars, if we are going to load our cars less heavily, will they increase or decrease immunity, and if they will increase it in some, will they increase it in those where the coal is self-decrepitatory or will they decrease it?

Truly, Dr. Wheeler is right when he says little is known about the coal-dust hazard. It is cheering that he says also in the addresses that we brief this week that perhaps 10 per cent of rock dust may help in this country even though 50 per cent has failed in some English mines. We hope he is not too optimistic in making this suggestion.

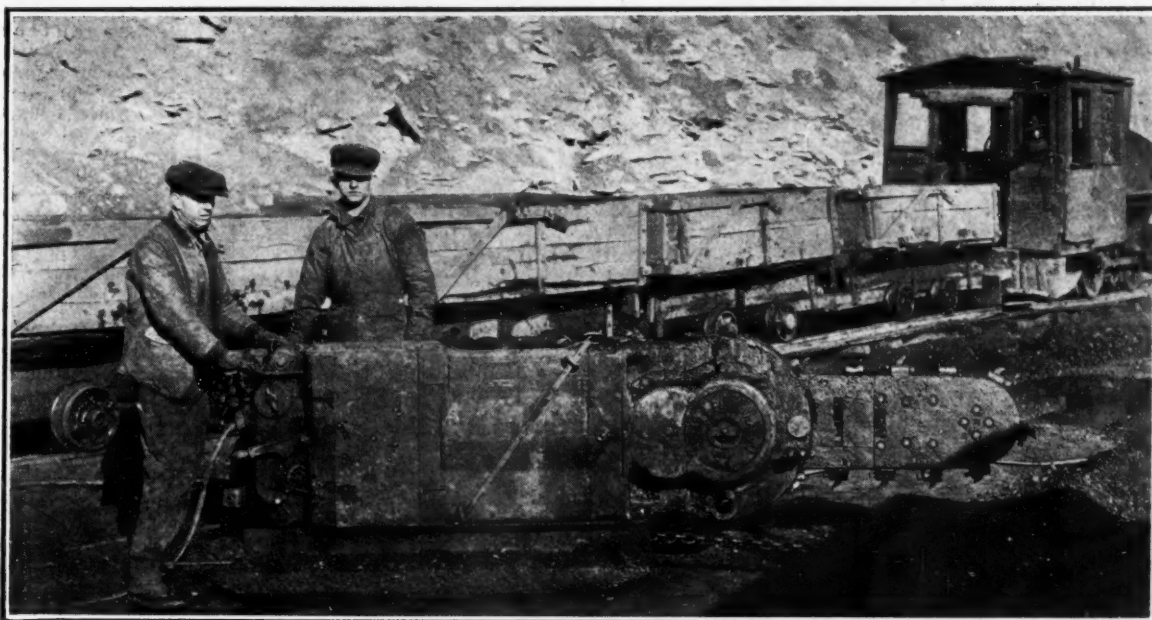
He needs, of course, to be careful of generalizations about the United States. It is less a unit than Great Britain. With lignite and low-volatile coal, with a relative dryness and wetness that Great Britain, we believe, cannot duplicate, we must be cautious in believing that his suggestion has a broad application to all sections of our country and must even be careful in assuming it is true in any of our bituminous coal mines.

Still his suggestion gives us all hope. We are sprinkling so much coal from the tops and sides of our cars that the suggestion that we use 50 per cent of rock dust is staggering unless we change our car loading, and adopt everywhere cars suited to the rotary dump such as Great Britain so generally, if not so invariably, uses. His table of applications of rock dust and their results might be valuable in England but here they merely suggest what we could do if we would mend our ways at great expense, for coal transportation, repairs and equipment.

Give Your Shovels a Fair Trial

TOO many companies try out a new mechanical shovel in a mine without providing the conditions that alone will make the experiment successful. To put one under the charge of a foreman already harassed by a thousand operating problems is not likely to bring the results sought. The better plan is to give the new devices a mine of their own, properly, yes, even excessively staffed, and then concentrate all effort on the results. If regarded as somebody's side issue they will not succeed.

Let the man operating the mechanical-shovel mine or the section worked with such a machine realize that his reputation depends solely on his ability to get results with the new equipment. Provide a suitable mechanical engineer and proper equipment for repairs. See that adequate locomotive service is provided. Let the shovels have every aid that good judgment prescribes, especially conveyor service. See that there are no delays at the tippie. Afford always adequate power for operation. After the device has proved its value it is always possible to extend its use, but if sent into a mine to take its chances with opposition from some and with the languid interest of others, it will almost certainly fail. The mechanical shovel needs sympathetic treatment from its owners or its problems will not be solved.



Machine for Channeling Coal in a Strip Pit

Coal Stripper Uses Ice Harvesters' Method

Turns Longwall Cutting Machine on Edge "Sawing" 28-in. Seam Into Panels 12-Ft. Wide So That Pop Shots Make Less Screenings—Scheme Reduces Over-all Cost of Coal

BY DON M. SUTOR
St. Louis, Mo.

THE coal strip-pit operator is taking a leaf from the ice harvesters' book. He is "sawing" up his coal into long panels, 12-ft. wide so that a few pop shots will loosen it in big lumps for easy and economical loading. This reduces labor and powder costs and saves time. It increases the value of the coal because the fuel comes cleaner and with less slack. It also improves strip-pit practice in a variety of other ways.

All this is directly creditable to the adaptability of a type of underground longwall coal cutter for open-cut mining. The machine, instead of lying in its normal horizontal position with its cutter bar extending outward, as for an undercut, is turned up on its edge with the cutter bar extending downward. Thus the machine performs the function of the ice harvester's cross-cut saw. The Leavell Coal Co., near Tulsa, Okla., is among the first to profit by this method.

MACHINE CUTTING REDUCES PRODUCTION COSTS

Most strip-pit men worry over their problems of loosening the coal. After the cover has been removed and the surface of the seam has been swept, the process of breaking up the coal is varied, and often is wasteful in cases where the coal is too thick and hard to be lifted by the loading shovel unaided. Usually many holes have to be drilled. The powder charge in these holes may be fairly heavy because the coal has only one loose end, namely, the upper surface of the seam. These relatively heavy shots necessarily shatter the coal and produce a large quantity of screenings and slack. Where the coal

can be wedged loose by the plug-and-feather method, the shattering effects of powder are avoided, but much time and labor are required to drill the holes and drive the wedges. The machine-cutting process as now practiced by the Leavell Coal Co., obviates these difficulties and reduces the production cost.

IS BIGGEST PRODUCER IN SOUTH WEST

The Leavell strip pit is one mile from the city limits of Tulsa, Okla. The company's holdings cover 600 acres of coal land, which is developed by stripping tracts 50 ft. wide and two miles long. The coal seam is 28 in. thick and furnishes an excellent grade of clean fuel, which is prepared in three forms, namely 6-in. lump, egg-and-nut mixed and slack. The annual output is about 110,000 tons. In 1922, the Leavell pit shipped more coal than any mine in the Southwest. In November, 1923, 10,200 tons were shipped.

The overburden is from 19 to 35 ft. thick, with varying quantities of blue and yellow shales, which must be shot to permit the stripping shovel to handle them. The drilling for these shots is done by water-well drills working from the surface. A steam shovel strips the coal. It is equipped with a 7-yd. dipper and an 80-ft. boom. The coal is loaded into three-ton cars with roller-bearing wheels, by a horizontal thrust coal loader, having a one-ton dipper and a pit width capacity of 65 ft.

Prior to last August, the coal was drilled with a hammer drill, operated by a belt-driven air compressor, and "shot off the solid." This method had a tendency



Machine Making Its Cut

The cutter bar extends vertically downward from the rear of the machine, channeling the coal as it works itself along the chain extending out at the right of the picture. Two men are required, an operator and a helper who shovels cuttings away from the channel. The chain causes the machine to move in a straight line, which is a great advantage, at the edge of the excavation.

to break up the lump coal, naturally reducing its market value.

Accordingly, in August, 1923, the company installed its vertical cutting or channeling Sullivan machine, and with it has obtained some interesting and valuable results.

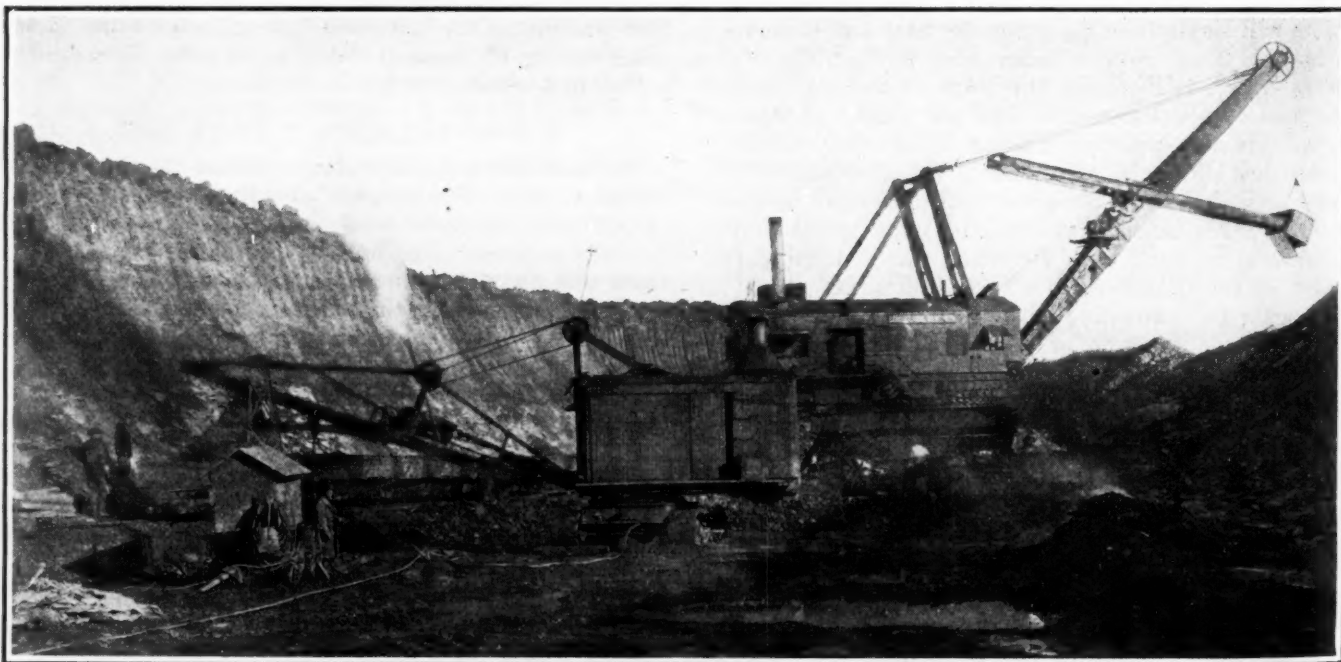
This new coal cutter is a longwall machine, turned up on its side, and mounted on a steel shoe or skid. When moving from place to place, the cutter bar is locked in line with the body of the machine. When ready to cut, the locking pin is removed, the feed chain attached to the machine, and a vertical sumping cut is made, similar to the horizontal cut made by the ordinary longwall cutter in a longwall mine. When the bar stands vertically, or at right angles to the body, it is locked in place, and the machine is ready to cut its channel.

The lines to be cut are laid off lengthwise of the pit, and a hole is bored every 50 ft. ahead of the machine.

In these holes pins are inserted, to which the feed chain is secured. The machine pulls itself along the chain on its skid, making a straight cut the full depth of the seam. Two men, a runner and a helper, handle the cutter. The helper's chief duty is to shovel the cuttings away from the channel.

At the Leavell pit, which as already noted is 50 ft. wide, four channels each 150 ft. long are cut by the machine 12 ft. apart, and the machine handles the 600 ft. of cutting readily in an eight-hour shift. It is thus able to keep well ahead of the loading shovel.

Two holes are drilled in each 12-foot. block of coal, 3 to 4 ft. in from the free end. These are shot with 6 oz. of black powder each, the two holes being wired together. The longitudinal cuts provide two additional free faces, so that the light powder charge is sufficient to crack off the coal, without materially shattering the lump. As a result, the percentage of large coal has been increased from 12 to 15 per cent, and the cost of powder

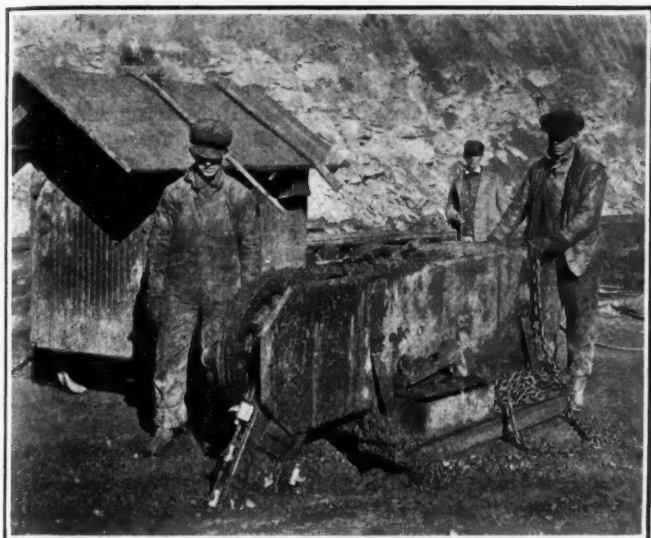


The Leavell Pit, Near Tulsa, Where Cutting Machines Made Their Debut in Coal Stripping

After the cover is removed by the big shovel in the background, longwall cutters, operating on edge, "saw" the 28-in. seam

into panels 12 ft. wide so that light shooting loosens it in big lumps for the loader in the foreground. Operation is speedier,

the loader gets greater efficiency, and the coal is produced at lower cost than it was under former methods.



Strip Pit Coal Cutter Getting Ready for Action

It is a longwall cutter turned on edge and mounted on a shoe. The chain, here shown unattached, is hooked to a pin 50 ft. ahead of the machine. The cutter bar, long enough to penetrate the seam, sumps in until it is vertical to the frame. Then the machine cuts along the chain.

per ton has been cut in half. One keg of powder now loosens 200 tons of coal, instead of 100 tons, which was all that could be obtained without channeling.

LESS THAN 20 PER CENT IS SCREENINGS

The tippie at the Leavell pit is equipped with shaker screens and loading booms. Their loading record in a recent month showed lump 65 per cent, egg-and-nut mixture 15.5 per cent, and screenings, 19.5 per cent.

A smooth, unbroken coal face is left by the mining machine instead of a jagged broken face. For this reason, it is possible to lay the loading track close to the cut with no danger of its crumbling under the weight of the cars and locomotive. Before the machine was used, a much wider shoulder had to be left for support. The clean, solid face also enables the loading shovel to do a better job, and it is estimated that the capacity of the shovel has been increased 25 per cent by this feature and by the larger coal obtained. The solid face also assists the stripping shovel on its next trip, and the cut is thereby carried as close to the overburden as possible. This reduces the quantity of coal lost by deposits of overburden from the shovel.

The cuttings from the machine are coarse and are graded as screenings and not as slack. With contemplated improvements in firing the big shovel, these cuttings may be substituted for lump, thus making some 300 tons more of large coal available for the market monthly.

The mining machine is operated on 440 volts alternating current, which is stepped down from the 11,000-volt supply of the Public Service Co., of Oklahoma, to 2,300 volts by transformers at the tippie, and carried along the pit side to secondary transformers which are moved as the pit progresses. Rubber-covered cable carries the 440-volt current from the pit bank to the machine.

The Leavell Coal Co. is obtaining from its channeling machine all the advantages which accrue from the use of mining machines underground, namely, a more marketable product at lower cost for powder and labor, a better physical condition of the property, and a more complete recovery of the coal.

Even Coal and Non-Siliceous Dusts Harmful to Health*

Any Dust, Especially if Not Soluble in Water Will Clog the Lungs—Miner's Asthma a Form of Consumption

BY D. HARRINGTON,

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THE following impressions regarding dusts in mines are the result of general observations in coal and metal mines during nearly 25 years, about seven years of which were devoted to a more or less intense study of dust. Though many of the views expressed are at variance with the ideas of eminent authorities, it is felt that there is at hand sufficient supporting evidence, though it will not be given here.

Any dust insoluble in the fluids of the respiratory passages, and in sufficiently finely divided form to float in the air and be breathed by underground workers, will ultimately be harmful to health if the dust is in the air in large quantities and is breathed by workers for long periods of time. This applies to insoluble non-mineral as well as mineral dusts or mixtures of them and includes coal dust or mixtures of coal and other dusts.

The lungs appear to be affected by dusts largely as would a sponge if its open spaces were gradually filled with fine sand; ultimately there would be practically no expansion or contraction possible and the ability of the sponge to take up or release water or similar material would be destroyed. As the lung cells are gradually being filled with dust, the lungs are correspondingly prevented from performing their usual functions, vitality is reduced and the body becomes a prey for disease germs, especially those of tuberculosis.

INFINITESIMAL PARTICLES SOLUBLE IN WATER

It appears that the dusts which lodge in the lungs usually are less than 10 microns in size, and are insoluble in the fluids of the lungs. It seems probable that much of the extremely fine, ordinarily insoluble, dust (that below 0.00001 in., or $\frac{1}{4}$ micron) is soluble in the lung fluids; at any rate, it has been proved that very small particles of such extremely insoluble matter as flint and chert (free silica) are definitely soluble in distilled water. It now seems probable that the dust dangerous to lungs is between 10 microns and 0.1 micron in size.

Silica dust, whether free or combined, is not always in equally dangerous form nor are all kinds of free silica (quartz, chert, flint, etc.) always equally dangerous, nor do particles of free or crystalline quartz always have sharp cutting edges, though when the sharp needlelike or knife-like edges are found, they constitute probably the most dangerous kind of dusts that can be breathed. Insoluble mineral dusts without presence of silica or mixtures of quartz or other siliceous dust, with other more or less insoluble dusts such as calcite, alumina, hematite, etc., are likely to be harmful if in finely divided state and present in large numbers in air breathed by underground workers.

Coal miners working at very dusty occupations or in moderately dusty but poorly ventilated places get a lung involvement, frequently within a few years, called

*Paper entitled "Dust and the Health of Miners," presented at the meeting of the Industrial Relations Committee, American Institute of Mining and Metallurgical Engineers, at its February session.

miners' asthma, which is generally miners' consumption, having essentially the same symptoms and ultimate effect as phthisis or silicosis. Where lung involvement does not occur, coal miners in fairly dusty occupations or in places with poor air circulation and moderate dust content of air frequently are afflicted with bronchitis, though the disease does not become apparent for many years.

Breathing of coal-dust laden air does not immunize or even partly protect a worker from being affected by miners' consumption when subsequently working in dusty metal mines; nor does work alternately in air laden with coal dust and with rock dust prevent harmful lung or bronchial involvement, and a worker with lung involvement from metal-mine air cannot expect relief by subsequently working in dusty or poorly ventilated places in coal mines.

The coal-mine occupations most likely to produce a dusty condition harmful to health are undercutting of coal or of material under the coal by chain machines, or the mining and shoveling of long-standing dry pillars, or working in places with little or no circulating air (especially when shoveling fine dry coal) or where frequent heavy blasts are made during the working shift.

OVER-EXERTION INCREASES DUST INHALATION

Contract workers in both coal and metal mines are more likely than others to be afflicted by dust diseases because of their failure to take time or to use available methods or appliances to protect themselves, and the over-exertion of contract workers causes increased rate and depth of breathing of dust-laden air, thus hastening the accumulation of dust in the respiratory passages.

When the air temperatures are above 80 deg. F., the humidity is over 90 per cent and the air is stagnant, the effects are intensified; and in mines with poor air circulation at working faces or where blasting is done during shift, poisonous carbon monoxide from explosive fumes hangs in the air and adds to dust danger by lowering the worker's vitality.

Some individuals are better able to resist the ill effects of breathing dusty air than others; and men of some nationalities seem less able than others to resist lung trouble from dust; the Irish and Finns apparently having minimum resistance to mine dust.

The logical remedy for the dust hazard in mines is prevention of the formation of dust, but that is not always possible and the most efficient and practicable method of protecting under-ground workers from dust is the circulation of continuous currents of pure air through and past points where workmen are found in mines. It is entirely probable that the reason why the dust in coal mines is less prejudicial to health than the dust in metal mines is due chiefly to the fact that the working places in coal mines are generally much better ventilated than those in metal mines.

Dust prevention in coal mines may be aided by: (a) using water sprays at the cutting chain on undercutting machines; (b) sprinkling the broken coal at the face with water while loading or after the car has been loaded, or both; (c) sprinkling the region of the working face before and after blasting; also at other times during the working shift; (d) sprinkling the roadways at least once or twice a week, washing down the ribs and timbers, as well as thoroughly wetting the floor; and if the roof material will permit, also washing down the roof, and timber caps near roof; (e) thoroughly spraying loaded coal cars at auxiliary partings, unless

they are sprinkled at the face, before they go into the main haulage roads, which usually have air currents of sufficiently high velocity to remove any fine dry dust from the tops of loaded cars; (f) eliminating blasting while the shift is in the mine. Blasting during shifts is dangerous to life on account of possible explosion or other accident; and dangerous to health because of the noxious gases that explosives produce, and because clouds of fine dust are thrown into the air to be breathed by the mine workers. Blasting during shifts is unnecessary, is an out-of-date practice and should be absolutely prohibited.

ROCK DUSTING NOT PREJUDICIAL TO HEALTH

The use of pulverized-rock dust in coal mines to prevent explosions is justified because the danger to life from explosions is infinitely greater than that from the breathing of dust. Moreover, dust is dangerous to health only when suspended in the air. The rock dust used to prevent explosions is not thus suspended and therefore cannot be breathed by workers. It is rather placed on the floor and ribs and in barriers. The relatively small quantity of rock dust thrown into the air during working periods should not be particularly dangerous to health, especially if the rock dust is selected so as to have minimum potential harmfulness.

Some authorities propose the introduction of coal dust into the air of metal mines as a possible preventive of miners' consumption. Even if this dust could be thrown into the air and kept there (a very difficult undertaking) it would introduce the explosion hazard into metal mines and, worst of all, would intensify the existing dust hazard rather than in any way alleviate it.

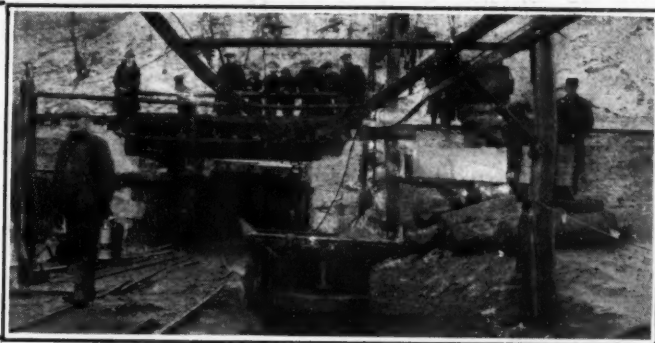
The usual types of respirators on the market do not prevent the breathing of the very small (hence most dangerous) dust particles, but, if workers could be prevailed upon to use them, the catching of the larger particles would help to hold some of the small ones; and the nasal and other passages thus relieved of catching the large particles would be more effective in catching the small. However, it seems impracticable to get respirators used at all consistently by workers.

All mining employees should be given physical examination at least once annually. To get definite data as to lung condition, X-ray photographs should be taken and interpreted by an expert on pneumoconiosis, otherwise dust involvement of lungs may escape notice, especially in coal mines, for several years.

Though coal dust is responsible for at least two-thirds of the loss of life in the mine explosions of the United States, it is entirely probable that a much greater number of men who have worked in our coal mines die annually of bronchitis, pneumonia, miners' asthma or other diseases caused directly or indirectly from coal dust, than die from mine explosions. It is well known that more men die annually from metal-mine dust than are killed in dust explosions in coal mines. Moreover, the economic loss from men partially disabled by different stages of miners' consumption in and around both coal and metal mines (though around coal mines the cause of the partial disability either is not named or is styled miners' asthma, etc.) certainly is not less than many millions of dollars per year in loss of output alone; and the misery caused the victims and their families cannot be estimated.

Hence dust is the scourge of the mine and the miner, and every feasible method of preventing its formation or of eliminating it should be consistently provided.

Shanktown Explosion Evidences Need of Greater Regard for Safety at Mines



Five Precautions Which Should Have Been Observed—Condition of Machine Which Inspectors Said Caused Explosion—Miller Seam Has Shown Recently Many Indications of Unsafe Conditions

TESTIMONY at the inquest into the explosion at the Lancashire mine of the Lancashire Coal Co. (a subsidiary of the Barnes & Tucker Coal Co.), at Shanktown, Pa., was to the effect that many precautions which should have been taken were disregarded. According to the evidence, trolley locomotives were operating in the return airways in violation of Art. 11, Sec. 6, Rule 77, of the State Mining Law of Pennsylvania; an arc-welding machine was used in the return air, which was known to contain at times dangerous quantities of explosive gas; cutting-machine cables not provided with closed-type switches were connected openly to trolley wires by means of "hook" connections;

slope and was developed by four main entries. The mine was ventilated by a reversible fan which ran as an exhaust, drawing 75,000 cu.ft. of air per minute against a water gage of 2.5 in. That section of the mine which gives off gas is shown in Fig. 2.

ELECTRIC WELDER WAS USED INADVISABLY

Fireboss Joe Adams testified that he found gas at times in all places he inspected on his rounds, and that gas was generated in dangerous quantities in all the live development entries. He admitted that a hoist, a pump and an electric welder, the first two machines not complying with the closed-type standards of the U. S. Bureau of Mines and the last an exceedingly dangerous appurtenance if used in places generating gas, were used in the Eighth Right section, where the explosion originated.

Examination of Mine Electrician Wolf disclosed that weekly inspections of cutting machines to detect defective connections, etc., were not made. Only when a machine broke down did it receive this attention. It was said that the rheostat cover on the particular cutting machine that the mine inspectors declared caused the explosion, and that was working in No. 1 Butt airway off the Eighth Right headings, had been punctured. In case of a short in the machine, the power circuit could not be broken through the controller without letting the customary arc of breaking project into the atmosphere. Neither fuses on cutting machines nor switches on cables, enclosed in explosion-proof casings, were used as required by the mining law.

It was stated at the inquest that though the rheostat cover is arranged for fastening with twenty-two bolts, only twelve were in place when the cutting machine was examined.

State Inspector T. J. Lewis, of the Twelfth Bituminous District, reported the finding of the investigation commission. It found explosive gas at the faces of the main slope entries but no manifestations that this was the source of the explosion. In the Seventh Left flat headings and in the room headings off the former and in some rooms also explosive gas was discovered.

An accumulation of gas was found in the Eighth Right flat headings. As shown in Fig. 2 the most advanced face is that of the haulageway, which is 223 ft. beyond the last crosscut. To avoid working the face to the dip the airway was being driven outby on the rise by a pocket from the last crosscut. Ventilation was maintained in this pocket by a canvas as indicated.



Fig. 1—Fan Came Through Explosion with Little Injury

Contrary to early reports little damage was done to the fan house by the force of the Lancashire mine explosion. A few leaks which developed in the roof were quickly stopped by tucking and covering with canvas.

no attempt was made to keep cutting machines safe by careful maintenance and weekly inspections, as required in Art. 11, Rules 1 and 70; miners without safety lamps in certain instances were allowed to fire shots, though a shotfirer was employed; such firing being forbidden under Art. 4, Sec. 14.

It must be conceded that the Lancashire mine No. 18 had not been long in the hands of the Lancashire Coal Co. Up to Dec. 15, just thirty-nine days before the explosion, it had been owned by the Glenside Coal Co. It was operated in the Lower Kittanning bed, sometimes termed the "B" or Miller seam. It was opened by a

Headpiece shows how slope mouth was not injured in any way. When the explosion occurred the hoistman was in the act of dropping down a trip of empties. All he saw was a big blow of smoke, which spent itself immediately on reaching the outside. Though stoppings were demolished, mine cars and track were little damaged. Rescue crews pushed mine cars of supplies ahead of them, in most cases without difficulty, as the roof did not fall as a result of the blast.

NOTE—Mine inspector's report on this disaster was printed in *Coal Age*, Feb. 21, p. 285.

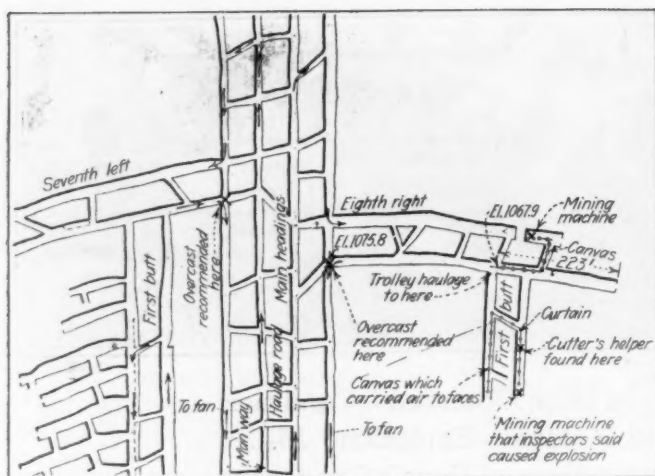


Fig. 2—Gaseous Section of Lancashire No. 18 Mine

Comment at the inquest favored the idea that, had the faces of the Eighth Right and those of its First Butt been driven in the ordinary manner, had the machines been duly inspected and had tests been made for explosive gas by the machine men, the explosion would not have occurred. With the entries as shown, too much reliance is placed on the efficiency with which the canvas would compel the air to sweep across the faces. Without overcasts, splits of intake air could not be made to reach the main cross-headings. Trolley wire, as will be seen, was strung in return air.

A mining machine was found in this place. There were no indications to show that the explosion had originated here.

At the face of the airway of No. 1 butt entry off Eighth Right flat headings, the commission found evidence of intense heat and much force developed outby. There was an accumulation of explosive gas at this point. Ventilation was maintained at the two faces of No. 1 butt headings by canvas strung from face to face through the first crosscut. At the face of the airway was a closed-type cutting machine which had completed a cut and apparently was being loaded onto its truck when the explosion took place.

A careful examination of this cutting machine showed that the rheostat was defective. Arcing apparently caused intense heat inside the cover. The heat was so intense that it had burned out the gasket between the frame of the machine and the cover, and also charred the lining of the latter. The rheostat, consequently, had ceased to be explosion-proof. The second point on the rheostat was burned off completely, and the first point was loose, whereas the third and fourth points were solid. Arcing in the rheostat without proper insulation was such that the whole machine became charged and could cause arcing at all points of ground.

ARCING, GAS AND COAL DUST MAY HAVE BEEN CAUSE

Such arcing, the generation of gas and the suspension of coal dust in the air may have combined to cause the explosion. A door on the return of the Eighth Right headings was blown out to the left rib of the nearest main heading, suggesting that the force of the explosion moved away from this particular place. Coked coal was seen on the inby side of the timbers, leading the inspectors to declare that the explosion moved outby. The machine cutter's helper was found about 70 ft. from the machine. It is believed that he was on his way to disconnect the cutting machine cable from the trolley on the Eighth Right, following the development of arcing in the cutting machine. Unfortunately, the explosion occurred before he could do this.

Reforms are much needed in the mines which are

working the Miller seam in Indiana County and the north of Cambria County, if the series of explosions extending over the last few years is to be broken.

In March of 1916 gas was ignited in the Robindale mine by an open light, eight men being killed. In May of 1920 an explosion of gas set off by an open light killed two men in the Lancashire No. 18 mine. Open lights ignited gas in Watkins No. 3 mine in June of 1921, killing two men who preceded a man trip into the mine; if it had occurred fifteen minutes later, this blast would have killed many men. At the Dilltown mine in April of 1922, four men were killed when a room hoist ignited gas. This hoist was located in a heading in advance of the intake air. The worst explosion of all took place in the Spangler shaft in November of 1922, when seventy-seven men were killed, a body of gas being ignited by an open light.

These six explosions together caused the death of 129 miners. The death toll might have been much greater had the explosions occurred when more men were at work. When workings in the Miller seam advance such great distances as to be covered by a thick overburden and gas is likely to be released in dangerous quantities, such workings become gaseous and call for compliance with those clauses of the mine law of the state that apply to gaseous mines.

Self-Rescuer From Carbon Monoxide Gas

Approval of a new type of safety device, a "self-rescuer," designed as a means of escape for persons accidentally caught in mine or other atmospheres containing carbon monoxide, has been given by the U. S. Bureau of Mines. This approval has been given to the Self-Rescuer, manufactured by the Mine Safety Appliances Co., of Pittsburgh, Pa., under the provisions of Schedule 14-A of the Bureau of Mines, which outlines the procedure for establishing a list of permissible gas masks.

The self-rescuer consists of a pocket size canister with mouthpiece directly attached, filled with granular fused calcium chloride and granular hoolamite (mixture of special copper oxide and manganese dioxide) which causes carbon monoxide in air to unite with the oxygen at ordinary temperatures forming harmless carbon dioxide. Cotton filters for removing smoke are also included in the canister. The self-rescuer and a nose clip for closing the nostrils are enclosed in a hermetically sealed brass case to prevent deterioration until used. The weight complete is about 1 lb. 5 oz. The small size permits carrying in the pocket or on the belt, for the latter purpose a metal belt loop being attached to the case.

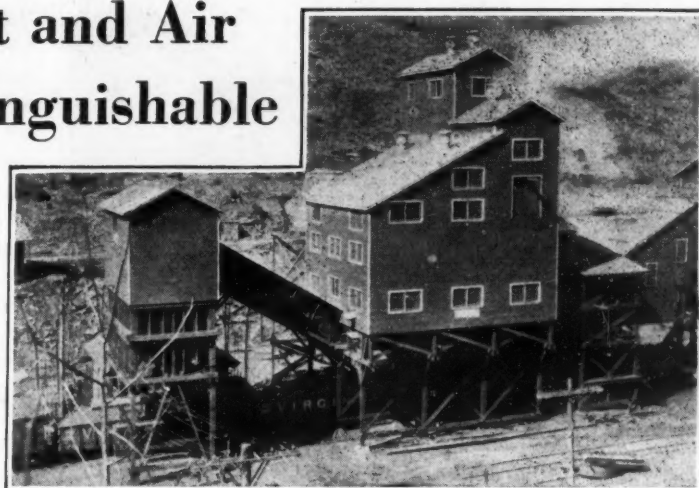
Carbon monoxide self-rescuers may enable miners to escape from atmospheres containing carbon monoxide in mines following fires or explosions. They may also safeguard workers in industries above ground where carbon monoxide may be encountered, such as around blast furnaces and metallurgical operations, or in the chemical industries.

The self-rescuer is approved only for carbon monoxide. The Bureau of Mines does not recommend its use as a substitute for carbon monoxide gas masks, having large canisters designed to protect persons who are called upon voluntarily to meet carbon monoxide in the course of their work. The approval rather is limited to self-rescue by persons who may be accidentally caught by carbon monoxide.

By Tumbling the Reject and Air Cleaning Smalls, Indistinguishable Bone Is Freed of Ash

Refuse from the Picking Table After Being Rolled Around Loses Its Coal Content Which Is Crushed in the Process—This Coal Is Then Winnowed on an Air Table

BY RAY W. ARMS
Chicago, Ill.



DIFFICULTIES which would have foiled earlier engineers who depended on water jigs are being met by dry-cleaning methods. Finely crushed coal was jigged inefficiently and with difficulty, and much coal was washed away in the streams. Now, the coal in the rejects of picking tables can be crushed and removed and then cleaned by air, giving an excellent slack product which will not freeze in the car or arrive at the market with excessive water. Furthermore, freight no longer has to be paid on water and rubbish that cannot be burned.

The dry-cleaning plant built for the Wyoming Coal Co. at Wyco, W. Va., is located on the Virginian R.R., four miles from Mullens, W. Va. The No. 3 Pocahontas seam at this point contains a middle band several inches thick which is high in ash, and grades gradually and with no distinct line of separation into the usual low ash and high quality coal characteristic of the No. 3 Pocahontas bed. The coal in the outer edges of this bone band resembles so closely the best coal that it is quite impossible to remove in the mine anything but rock and a small quantity of the heaviest of this bone.

The coal, after being brought to the surface, is passed over a 1½-in. screen, the lump being hand-sorted over picking tables to remove as much of the bone coal as possible. After picking, the lump and slack are usually reassembled in the form of picked run-of-mine, as it is that size of coal which is marketed from this mine, and in fact, from a large part of the territory tributary to the Virginia R.R.

It soon became evident however that so much of the ash of the resultant run-of-mine coal was due to the slack, which could not be hand-picked that it was necessary to provide some means of mechanical separation.

W. P. Tams, president of the Wyoming Coal Co., personally conducted tests on various cleaning devices and finally determined that the best results could be obtained by installing a Bradford breaker in which the larger lumps of hand-picked bone could be shelled from the adhering coal, a pneumatic cleaning plant being added to clean the slack as well as to treat the fine coal obtained from the Bradford breaker. This cleaning plant was expected to remove all rock and those poorer grades of bone coal which were tending to keep the ash in the slack above the desired figure.

The plant, to accomplish this purpose, was designed and built by the Roberts and Schaefer Co., using a

Bradford breaker, elevators, conveyors, Hum-Mer screens, Universal rescreens, American pneumatic separators and a B. F. Sturtevant Co. dust-collecting system. The plant is constructed of timber and built adjacent to the tippie to which it delivers its cleaned product.

The first operation is that of breaking down the big lumps of bone coal in the Bradford breaker. The fine coal from this goes to the cleaning plant and the rejected material directly to a rock bin. The slack from the tippie together with this fine coal go direct to the foot of a bucket elevator capable of handling 175 tons per hour which raises them to the top of the dry-cleaner building whence they go through the succeeding operations by gravity.

A cross conveyor takes the coal from the elevator and distributes it to the top of a tandem series of four Hum-Mer screens, each of which drops the undersize to a pocket and delivers its oversize directly to the succeeding screen. The openings in these screens are of a size to divide the coal into the proper proportions and the proper sizes for the pneumatic separators. The undersize from the first of these screens is delivered to a second set of four screens which separates the fine coal into the sizes to be tabled.

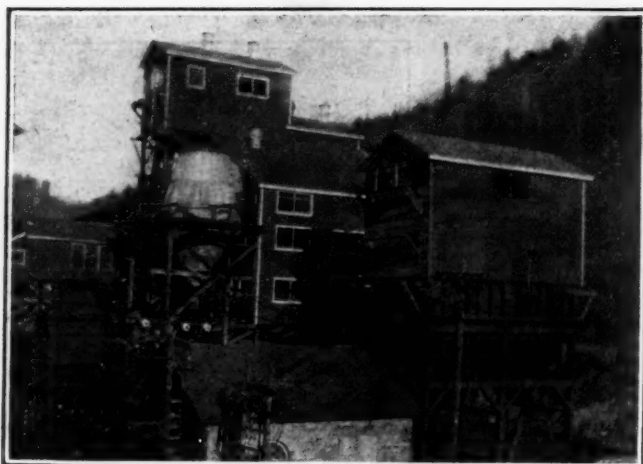
DOESN'T TREAT SLACK UNDER ⅛ IN. DIAMETER

The finest of these screens is ⅛ in., the undersize of which is bypassed without further treatment to the slack coal. All screened products except these fines are run into five hoppers, each of 4-ton capacity, feeding the pneumatic tables. Attached to the bottoms of the bins are fine Universal rescreens which serve further to screen the products and remove the fine breakage occurring in the bins. These screens not only improve the operation of the table but reduce the dust which would otherwise be blown about on the table floor.

The re-screens feed to the five pneumatic separators which grade the coal in a discharge line varying from the heaviest refuse at one end to the best coal at the other. This line is divided into finished refuse (which is discarded) cleaned coal, and middlings, which are either to be returned to the foot of the elevator for retreatment in the plant, or used as a separate product under boilers or sold together with a part of the good coal as an inferior product.

The finished products are collected on a single, two-compartment, gathering conveyor which on one strand takes the cleaned coal to the tippie and the middlings to the elevators and on the other strand delivers the

NOTE—Illustration in headpiece shows Wyco dry-cleaning plant.



Another View of Dry Cleaning Plant with Tippie

In this plant the refuse from the picking table is broken in a revolving breaker and the fine coal removed. With the slack from the mine, the coal is sized and cleaned on air tables. The middlings product of these tables can be used under the boilers or again sent back through the process.

refuse to a bin and the middlings, if desired, to a separate bin.

To control the dust about the plant, care was taken

to keep the fine coal at all times under cover so that dust could not escape. With this end in view all conveyors, chutes and elevator were covered. Over the tables, where air tends to keep the dust in circulation, are placed dust hoods with such suction provided that all the air is removed from the covered area, a surplus being afforded to insure that the hoods will remove all dust. The covered area varies from about 50 per cent of the table surface to about 90 per cent, depending on the fineness of the coal and its tendency to produce dust. To prevent dust clouds from boiling up during screening, suction is provided on all hoppers leading from the screens. All the dust-laden air from these various sources goes through a fan and to a cyclone collector which removes the dust and delivers it to a covered screw conveyor which returns it to the slack.

The Wyco plant started operations Feb. 1 and has been running continuously ever since. It is too early to state what the actual results of the operation will be as the organization and training of the operating crew and the adjustments always incident to the starting up of a new plant so far have occupied the time of those in charge. From the few days of operation, however, it is apparent that refuse and bone are being removed from the coal with a minimum of expense.

The Miner's Torch

Making the Smoke Problem Our Problem

EVERYONE connected with the coal industry should be interested in Technical Paper No. 273, Subject: "Smoke Abatement." This paper has just come from the press and copies can be obtained from the U. S. Bureau of Mines, Washington, D. C.

During the war while there was a shortage of coal and an ever-growing demand for more and more production, most city smoke abatement ordinances were allowed to become ineffective, but now with a plentiful supply of coal assured there seems to be a growing demand for the enforcement of such ordinances.

Mr. Coal Operator, your city friends are liable to ask you embarrassing questions after they read some of the proposed smoke ordinances or listen to speakers who are working up a demand for such edicts. The paper referred to will give you the answer to most of the questions that will be put to you and instead of being on the defensive you may pose as an authority on the subject.

If the soft-coal men do not wake up it will only be a matter of a few years before coke, gas, or some other substitute will take the place of the soft coal now being used for domestic purposes. Although smoke from residences furnishes only about 10 per cent of the total smoke of the cities, such smoke is particularly destructive in its effects on property and vegetation and there is a growing conviction among physicians that it affects seriously persons suffering with acute lung diseases and possibly is one of the most common causes of cancer.

There may be chance for argument in discussing the effect of smoke on health because this is as yet largely a matter of opinion, but there is no chance for argument when committees appointed by city governments submit figures showing the additional cost to the aver-

age citizen for laundry bills, paint bills, etc., because of smoke-polluted air.

Of course, if we are to believe all the reports coming from the Ford engineers it will only be a few years at most until all soft coal will be turned to low-temperature coke and the smoke problem will be solved, but the paper under discussion does not mention the work of the Ford engineers and simply states "During the past 10 years increasing attention has been given to the possibility of low-temperature carbonization."

Approximately one-half of the paper deals with the domestic smoke problem and the information which it contains should be in the hands of everyone who burns coal for domestic purposes. If the producer of coal will pass such information on to the consumers he will render a service that must have far-reaching results. For example we learn that by simply changing the method of firing and without the expenditure of a penny for equipment the density of the smoke from an ordinary hot air furnace can be reduced from 11 to 4 per cent. The same thing is almost true of grate fires and kitchen-stove fires. I venture to say that half of the coal men who read this will question this statement at first sight so let me hasten to say that this is honest-to-goodness information and not propaganda.

One of the unfortunate conditions surrounding the coal industry is the lack of a point of contact between the producer and the consumer. The product that the consumer obtains is far from attractive in appearance and when he comes to pay for it he sees red instead of black. He knows nothing of the problems of the man who has his money invested in coal mines, nor of the men whose sustenance is dependent on their labor in the mines. If his memory is good he recalls "Coal Barons" and "Reds" but beyond that all is a blank. Taking such facts into consideration, would it not be better for the coal producer to take the initiative in assisting the general public with its smoke problem rather than to wait until the daily papers start the campaign with scary headlines something after this manner: "Soft coal smoke doubles our laundry bills and destroys our shade trees"?



Haig Pit*

©Keystone View Co.

Dr. Wheeler Explains That Wet Coal Dust Is Still Coal Dust And Liable to Explode

Only One Sure Cure Exists and That Is Fine Rock Dust, Not Only in Barriers, Though That Is Well, but Also Spread on Sides and Floor of Passageways

BY A. F. BROSKY

Assistant Editor, *Coal Age*

ROCK dusting—or “stone dusting” as the English mining engineers term the mixing of limestone or shale with coal dust to check the propagation of an explosion of the latter—seems likely to be adopted as a general practice in the United States. The interest created in this work following the recent visit abroad of George S. Rice, of the U. S. Bureau of Mines, and others is being intensified by a return visit to this country of Dr. R. V. Wheeler, director of the Mines Department Experimental Station at Eskmeals, and Henry Walker, deputy inspector of mines, both of Great Britain.

Arriving in New York City too late for the 129th meeting of the American Institute of Mining and Metallurgical Engineers, they made their first appearance in Pittsburgh, where the coal-mining activity of this country naturally centers. At a series of meetings the conferences in the Pittsburgh station of the U. S. Bureau of Mines, and in two lectures at the Carnegie Institute of Technology, Dr. Wheeler spoke of the factors which enter into gas and coal-dust explosions, placing greatest emphasis on the prevention of the latter by rock dusting; in fact he was obliged to do so because of the astonishing interest taken by men who attended these gatherings. Time and again his audience would revert to rock-dusting, revealing the thoughts which were uppermost in their minds. Can we and shall we dilute the content of combustible material of the dust which gathers in our underground workings? No doubt we shall.

DINNER IN ATHLETIC ASSOCIATION CLUBHOUSE

The English visitors were welcomed to the smoky city by a dinner in the clubhouse of the Pittsburgh Athletic Association. Men from the Bureau of Mines, representatives of coal companies, technical educationalists and engineers made up the dinner party of thirty-seven, which was limited in number to make the get-together informal. The after-dinner talk resolved into a quizzing of Dr. Wheeler and Mr. Walker who in turn asked questions of our own engineers. Inspection, regulation and practices as applied to the elimination of hazards in the mines of both countries were the topics

of discussion; rock-dusting was a subject much to the fore. Dr. Wheeler advocated without qualification the use of rock dust as the means best suited to prevent dust explosions, declaring that they will occur even after all other precautions have been taken. That rock-dusting does not remove the need for continuous effort in diminishing the hazards due to ventilation, electricity and machines, was another high mark in his speech.

No doubt the readers of *Coal Age* who did not have the opportunity of hearing Dr. Wheeler in Pittsburgh last week are eager, as were the 200 men who did, to learn more about explosions and how they may be made less hazardous by rock-dusting and other means. Lack of space limits this report to an account of Dr. Wheeler's two lectures and the discussions which followed in the “union room” of the Carnegie Institute of Technology in the evenings of March 5 and 6. What was said along similar lines at a joint meeting of the civil engineering section of the Engineers' Society of western Pennsylvania, the Pittsburgh section of the American Institute of Mining and Metallurgical Engineers and the Coal Mining Institute of America on the evening of March 4, as well as all that transpired in the assembly room of the Bureau's Pittsburgh station during an all-day mine safety conference will be told in next week's issue.

FIREDAmp EXPLOSIONS SLOWER THAN COAL DUST

In his first lecture Dr. Wheeler dealt with the causes and physical characteristics of explosions in coal mines. Though these explosions account for only a small percentage of the fatal accidents that occur in coal mining, most of the deaths being due to falls of roof, they serve to make imminent an even more serious disaster. Much patient study has been devoted therefore, to the character of firedamp and coal-dust explosions, with a view to reducing, by the adoption of preventive measures, the likelihood of their occurrence.

Firedamp explosions, as compared to those caused by ignition of coal dust, are comparatively easy to study. The speed of propagation of a flame of firedamp and air is comparatively slow. Dr. Wheeler showed by curves on a lantern slide that the most rapid flame under conditions of “uniform movement” originates from a mixture of $9\frac{1}{2}$ to $10\frac{1}{2}$ per cent of methane with air.

When this mixture is ignited the flame moves with a speed of 90 cm. (35.4 in.) per second; the speed of an 8-per cent mixture is 70 cm. (27.6 in.) per second, and

*At this pit, which forms part of the Whitehaven Collieries, Cumberland, England, a serious explosion occurred Sept. 5, 1922. The Chief Inspector of Mines reported that it originated from the flame of a shot and that the evidence of coked dust showed that coal dust, even though wet, had aided in extending the explosion. The mine generated gas and the explosion apparently was preceded by a sudden outburst of methane. The face of the working place contained a big pool of water, and the management asserted that the mine was “naturally wet throughout,” yet coked dust was found on some of the ribs and props.

that of a 14-per cent mixture is only 30 cm. (11.8 in.) per second. A mixture of air with $6\frac{1}{2}$ per cent of ethane will propagate flame with greater speed than any mixture of methane. Fortunately ethane does not occur in coal mines.

The data mentioned in the preceding paragraph of course refers to a mixture of methane with pure air, which contains 20.9 per cent of oxygen. In mines the air is not pure. This leads to the question: what are the limits of inflammability of firedamp with impure air? And naturally it can be answered only in a general way by saying that the limit of speed is considerably reduced in air that contains much less than 20.9 per cent oxygen.

When the ignition point of a firedamp flame is at the open end of a tube which is closed at the other end, the speed of flame propagation is 140 times greater than that of a flame ignited at the closed end. If a gallery is open at both ends the most dangerous condition obtains for that condition favors a prolongation of the period of an explosion. In a gallery with one end closed, a partial vacuum is set up which tends to break the flame and extinguish the explosion.

A moving current of methane and air increases the speed of propagation of an explosion and develops the maximum pressure more quickly. When the velocity of the current is 75 cm. (29.6 in.) per second, the speed of propagation of an explosion is more than five times as fast as it is when the mixture is at rest prior to the explosion.

MANY DUST-EXPLOSION PROBLEMS UNEXPLORED

Many of the basic phenomena attending coal-mine explosions are yet in doubt, despite the years of study devoted to the subject. It is assumed that the laws which govern the propagation of flame in explosive-gas mixtures are applicable to explosive mixtures of coal dust and air. Nevertheless, we do not know such important details, as the exact effect of various conditions in the working places and galleries, and many of the physical and chemical actions relating to the bringing together of coal dust, air and ignition agents.

The speed of a molecule of oxygen is 350 m. (1,150 ft.) per second, which is in striking contrast to that of the gently floating particles of coal dust suspended in air. An analogy between the ignition of a mixture of gases with that of a mixture of coal dust and air therefore is not accurate. Consequently, generalities only may be dealt with.

Many coal-dust explosion tests have been made at the Eskmeals station in England within steel-tube galleries. The maximum pressure produced by a coal-dust explosion in a gallery of uniform cross-section is 50 lb. per square inch at a distance of about 500 ft. from the point of ignition. Three restrictions in the airway formed by the introduction of angle irons, so arranged as to reduce the diameter of the testing gallery by 1 ft., increased the pressure of the explosion at a point 450 ft. from the source of ignition to 152 lb. per square inch. Without these restrictions, other conditions remaining the same, the pressure is 16 lb. per square inch at a point 450 ft. from the point of ignition. Restrictive barriers in the testing gallery serve the same purpose as timbers in a mine to create turbulence and intensify the pressure caused by a coal-dust explosion.

Captain Steidle, Carnegie Institute of Technology, opened the discussion following the first lecture by asking what effect the fineness of coal dust had on the

propagation of an explosion. Dr. Wheeler replied that the finer the coal dust, the greater the speed and the greater the violence of the blast. The English standard of fineness for the coal dust used in tests specifies that 85 per cent shall pass through a 200-mesh screen.

J. T. Ryan asked whether gas in a bituminous mine could explode in the presence of coal dust without the latter entering into the blast. He was told that a gas explosion in all probability would raise a cloud of coal-dust which would combine with the gas and air to increase the intensity of the explosion. Though no tests have been made in England to prove this point conclusively, Dr. Wheeler is of the opinion that coal dust figures in practically every explosion.

DOUBTED IF VACUUM WOULD STOP EXPLOSION

Dr. Holbrook inquired whether a vacuum created at the closed end of a gallery would stop the propagation of a coal-dust explosion as it does one involving gas alone. Professor Wheeler did not think so, though he had no results of tests to prove his belief. To a question by G. S. Baton as to the effect of the volatile content of coal dust on the ignition and propagation of a flame, Dr. Wheeler said that higher contents of volatile matter increased the ease of ignition and the speed of propagation.

In Dr. Wheeler's second lecture on the prevention of explosions, he said that to eliminate many of these catastrophes in coal mines the surest procedure is to exclude the use so far as practicable of all potential means of ignition, or so control their use as to render them harmless. Blownout shots are the chief cause of explosions in England. The explosives causing them, unfortunately, have been approved by the Department of Mines. Dr. Wheeler commended the record established in this country in that no explosive approved by the U. S. Bureau of Mines has ignited firedamp on blowing out from a shot hole.

"It is flying in the face of Providence," he said, "to use other than permitted explosives in mines in this country." He asked, "Why the devil do you use that term 'permissible explosive' when you mean 'permitted explosive.'""

Correctly designed flame safety lamps are incapable of igniting any mixture of firedamp and air, even though the velocity of the current is very high. An exposed filament of an electric cap lamp can ignite any combustible mixture of firedamp and air. Electric cap lamps of modern construction make the possibility of ignition remote unless they are damaged. Trolley wires create a hazard that cannot be harnessed.

Electric motors and controls are a means of ignition. They can be made flameproof by enclosing them within a casing. The English point of view differs from that of the American. The British strive to make a casing pressure- as well as flame-proof. An explosion inside a casing will burst it if it is not made sufficiently strong. Flame- and pressure-proof motors make for clumsy machinery. A hermetically sealed casing is the best assurance of protection against flame and pressure. The English are working on a flanged joint. It has been proved that a $\frac{3}{4}$ -in. slot gives the maximum release of pressure without allowing flame to reach the atmosphere outside the casing. A slot no wider than

*The answer is simple. For the U. S. Bureau of Mines to use the expression would be assuming the power of permitting or prohibiting other explosives, which under constitutional provisions, it does not have except in certain specific mines and on the Indian lands.



Dr. Wheeler, Messrs. Walker and Chapman with American Friends at Bruceton Mine

Taken during an exhibition test at the experimental mine made Friday, March 7. From left to right, John T. Ryan; A. A. Munsch, U. S. Bureau of Mines; Robert M. Lambie, chief, West Virginia Department of Mines; M. Morris, chief of rescue crews,

of that department; J. J. Paul, U. S. Bureau of Mines; Henry Walker, Deputy Inspector of Mines, Great Britain; Dr. R. V. Wheeler, Director of Mines Department, Great Britain; F. E. Cash, U. S. Bureau of Mines; W. R. Chapman, secretary to

Dr. Wheeler; George S. Rice, C. M. Bouton, H. P. Greenwald, A. C. Fieldner, all of the U. S. Bureau of Mines; Edward Steidle, co-operative mining department, Carnegie Institute of Technology, and H. C. Howarth, U. S. Bureau of Mines.

0.01 in. permits of a fair release of pressure. The margin of safety between these two limits is wide. Dr. Wheeler doubts if true frictional sparks are capable of igniting firedamp under mining conditions.

Even after all preventive steps covering the possible means of ignition described in the preceding paragraphs are taken at least two other agents must be made harmless—they are firedamp and coal dust. The former can be rendered harmless by adequate ventilation, but this often increases the hazard of the latter by stirring up dust.

Methane must be in excess of $5\frac{1}{2}$ per cent to propagate flame. A proportion of methane of $2\frac{1}{2}$ per cent is well on the safe side. It is questionable whether it is necessary to dilute methane by ventilation to a limit of $2\frac{1}{2}$ per cent. Some people advocate a further reduction, arguing that a $2\frac{1}{2}$ per cent indication of methane in one place may mean a higher methane content in another. On the other hand, a $4\frac{1}{2}$ per cent limit would give the same warning of danger.

GREAT BRITAIN RELIED ON WATER TOO LONG

No feasible quantity of ventilation will increase the volume of air to such a degree as to reduce the coal-dust percentage below the limit of inflammability. No more than 0.1 oz. of 200-mesh coal dust per cubic foot of air is required to propagate a coal-dust explosion. Many times that quantity is present in bituminous mines. Ventilation consequently does not remove this hazard. Coal dust is not an explosive in the same sense as black powder. It is dangerous only when suspended in the air as a cloud, and may be made innocuous by preventing it from forming a cloud.

Prior to the adoption of stone dusting, the wetting of mines was extensively practiced in England. When applied to the roof and sides of entries, water caused the former to become insecure and greatly increased the hazard of falling rock. The chemical composition of coal dust renders it difficult to wet down with water.

Solutions of several salts will wet it, but the arrangement is not any more practicable than to use alcohol, which also will wet coal dust. The quantity of water required in coal dust to make it comparatively safe is 30 per cent, though some coals may not need so much.

A coal-dust explosion is known to have occurred in a very wet English mine. Two shots within a short period of time and in close proximity to each other were directly responsible. The first shot released a pocket of methane which latter was ignited by the second shot. The flame traveled a short distance as a minor gas explosion and then increased to great violence. An investigation of the explosion showed that a skim of coal dust floating on water caused the continuance of the explosion, yet the entries were "swimming" in water.

EVEN 10 PER CENT OF ROCK DUST MIGHT HELP

In 1886, Sir William Garford suggested the use of rock dust to correct the tendency of coal dust to ignite and propagate flame. He had observed that airways, where practically only rock dust was found, checked explosions which had penetrated wherever coal dust lay.

Whatever efforts are expended in the direction of rock-dusting will do good varying in degree with the quantity of rock dust distributed. The addition of a small quantity of incombustible material will aid in reducing the violence and spread of the explosion. A mixture of coal dust with 10 per cent of rock dust is sufficient to reduce that violence to one-tenth. Pure coal dust in an explosion moves at a speed of 1,070 ft. per minute, producing a maximum pressure of 50 lb. per square inch. Coal-dust with 10 per cent of incombustible matter propagates a flame at a speed of 425 ft. per second creating a pressure of 4.8 lb. per square inch.

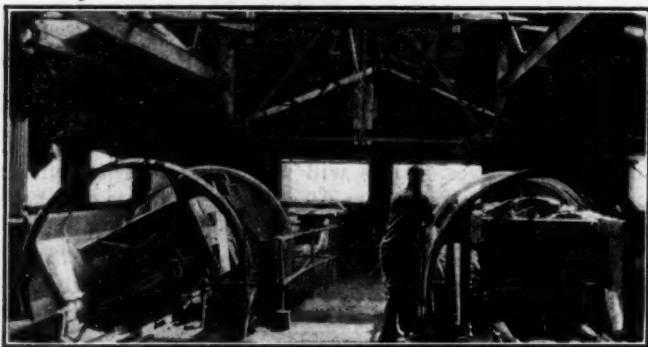
The most important English act relative to rock-dusting is that which specifies that the incombustible material in the dust in mines be maintained at 50 per cent by the addition of rock dust as needed. In some

instances, as much rock dust as has been specified may be necessary, in others, more is required. In the United States the mines may not have to maintain so large a percentage of incombustible matter to obtain an equal immunity. An addition of 10 per cent of rock dust is well worth striving for.

Small particles of coal dust are the most dangerous. To be most effective, the rock dust must be at least as fine as the coal dust with which it is mixed. In England 70 per cent of the dust must pass through a 200-mesh screen when it is to be distributed through the mine automatically, whereas when the rock dust is distributed by hand, if only 50 per cent will pass such a screen the dust will comply with the terms of the law.

GRANULES OF COAL MAY REDUCE EXPLOSIVE VIOLENCE

It is conceivable that granular coal mixed with fine coal dust will lessen the violence of an explosion. This conclusion seemed indicated by an investigation into the circumstances surrounding a certain English mine explosion. On the entries of this mine was strewn dust containing 80 per cent of incombustible material. A firedamp explosion at a working place soon spent itself



Rotary Dumps at Stag Canyon Mine

Note the full car on the right. At some mines such a carload would cause the foreman to reprimand the miner who loaded it but at the Phelps Dodge operation the miners are not allowed to build up the coal on their cars. Consequently the spillage, which makes rock dusting largely ineffectual, is avoided. The Phelps Dodge Co. had no rock dusting when this photograph was taken but they sought to reduce the quantity of coal dust in their roadways by ordering that their cars be merely "rounded on top."

along the rock-dusted entries. An investigation revealed the location of the source of the explosion. In its path was a patch of coal dust which was not ignited because it was intermingled with a considerable quantity of coal of the coarser sizes, the largest of which particles were about 1 in. in diameter. The mines in the United States after all may not have to add as much incombustible material as at first is expected.

It is not a difficult matter to reach the necessary saturation of rock dust. At the end of the first year of rock-dusting in a Yorkshire mine, samples at various points were taken yielding the following average percentages of incombustible material: 79.9 per cent on endless-rope haulageways; 67.5 per cent on other haulageways; 80.2 per cent on traveling ways; 68.4 per cent on return airways and 69.4 per cent on cross gates. In Table I is given a self-explanatory quantity study of rock-dusting in a South Wales mine.

Stone dust must be applied wherever coal dust is found in order to narrow effectively the limits of a local coal-dust explosion. Rock barriers are only a second line of defense; dusting is the first. Never should the barriers be used alone.

The health of a miner is not impaired by the use of limestone or a shale free of siliceous granules. Dr. J. S.

Table I—Effectiveness of Applications of Rock Dust in Maintaining Ash Percentage Required

Quantity Lb. Per Lin. Yd.		Number of Applications Per Annum	Quantity of Stone Dust in Lb. Per Lin. Yd. at Each Application	Percentage Ash Maintained
180	Roof, sides and floor	12	7½	55 to 65
		36	2½	50
90	Roof and sides	4	22½	70
120	Roof, sides and floor	8	15	50
70	Roof, sides and floor	2	35	70

Haldane made what Dr. Wheeler termed a very favorable approval of the practice so far as health is concerned. The former reported that inhalation of the dust of soft stone is no more injurious than that of coal dust. Limestone is absolutely harmless, and by reason of its white color, it aids greatly in screening the light in the mine from the absorption effects of the coal, 98 per cent of the light that strikes the face being taken up by the coal. Thus limestone improves the illumination. Incidentally, the latter benefit decreases nystagmus, a common ailment of English miners. Gray shales are not so satisfactory.

That is how matters stand in England. They are satisfied for the time being and "are content to leave the security of their mines in the hands of stonedust," while scientists search for a better means of safeguarding mines than this "empirical remedy" affords. Stone dusting has been described by the latter phrase because nobody knows much as to the manner in which it acts.

DOES ROCK DUST MERELY COOL THE FLAME?

A discussion followed this second night's lecture. Dr. Wheeler is not satisfied that he knows just how rock dust prevents the ignition or propagation of coal dust. In answer to Edward Steidle's question on this point, he said, "One theory is that the particles of rock absorb heat and check the spread of flame."

Richard Maize wondered if a combination of suspended coal dust and firedamp below the lower limits of 0.1 oz. per cubic foot and 2½ per cent respectively, would cause an explosion if they could be ignited. Dr. Wheeler didn't know how such a combination might act together. Each of these lower limits is fixed without reference to the other.

A. C. Fieldner thought the audience would be interested in hearing how stone dust is applied. In response, Dr. Wheeler described briefly three common methods: (1) Shoveling by hand from tubs (mine cars) to roof and sides allowing the material to settle on the floor; (2) automatic distribution by dust car attached to the end of a train of tubs, power for blowing being derived from the moving axles of the tubs; (3) compressed air. This is used mostly in South Wales.

In addition to these methods, an unsuccessful attempt was made to apply the dust to the intake air, depending upon it to carry the dust. In one mine an interesting arrangement was devised in which a cloud of rock dust was directed toward a face while the latter was being shot down. This method is effective but hardly practicable.

J. W. Paul inquired as to the maximum quantity of explosive permitted in a single shot. He was told that only explosives on the British "permitted" list may be used and that the largest charge allowed is 18 oz. For coal, it is usually 4 oz.

C. L. Colburn recalled Dr. Wheeler's account of an explosion of a skim of coal dust on the water standing

in the entries of a very wet mine, and then asked what effect rock dust would have in a similar case. Dr. Wheeler said stone dust would absorb moisture and tend to drag down the skin of coal dust which otherwise would float on the water. He also let it be known that he has an aversion to adding more dust to an already dusty mine and would like to see a limited quantity of water added with the rock dust. He frankly admitted that many of his countrymen did not agree with him.

M. D. Cooper asked: "What arrangements are made by British mine owners for preparing or obtaining a supply of rock dust?" The lecturer described briefly the following schemes: (1) Dust ground in individual plants at the mine, using the "mortar-and-pestle" type of mill; (2) dust purchased from a commercial milling plant; (3) a partnership of several mine owners in a group milling plant. A recent development has been the use of a byproduct obtained in the manufacture of alkalines.

In answer to Alphonse F. Brosky's question as to why the fineness of rock dust is so specified that 70 per cent must pass through a 200-mesh when it is applied by machine, whereas only 50 per cent must pass this test when shoveled by hand, Dr. Wheeler said that the finer sizes are less injurious to health and more easily



Edward Steidle

Professor of mining engineering, Carnegie Institute of Technology, Pittsburgh, Pa. Captain Steidle has charge of the co-operative mining department maintained by his institution and fostered by the U. S. Bureau of Mines.

distributed by machines. In hand shoveling, larger sizes tend to clean off coal dust from ledges on the roof and ribs, allowing the smaller sizes of rock dust to settle there free of coal dust. Coarseness in size is more important in hand shoveling than is fineness in machine distribution.

J. T. Ryan asked if it would not be safer to leave coal dust on the floor of an entry than to shovel it up, when unmixed with rock dust, as the operation would raise a cloud of dust, much of which would settle on ribs and roof. Dr. Wheeler agrees that the loading out of coal dust with shovels makes a dangerous condition more dangerous. When rock-dusting is used, the continual addition of both coal dust and rock dust to that already on the floor must ultimately necessitate the shoveling out of the accumulated mass at more or less wide intervals of time. Flotation methods of separation are working

quite successfully to produce a merchantable coal dust and a byproduct that might be used again in the mines. He believes the Trent process well adapted to this separation.

Somebody inquired, "What percentage of the mines in England are using rock dust?" Dr. Wheeler's reply was, "Practically 100 per cent. There are, however, a few mines where this practice is not necessary."

Coal-Mine Accidents in Great Britain Take 1,289 Lives in 1923

In the coal mines of Great Britain there were 1,143 accidents, which caused the death of 1,289 men, in 1923, as compared with 1,026 accidents and 1,105 deaths in 1922, according to a preliminary report issued by the Mines Department. Major accidents of 1923 are shown in Table I.

Table I—Major Accidents at British Coal Mines in 1923

Date	Name of Mine	Nature of Accident	No. Killed
Feb. 22	Wheldale (Yorkshire)	Explosion of firedamp	8
Feb. 24	Medomsley (Durham)	Shaft accident (cage came out of guide due to worn shoes)	8
Apr. 24	Apedale (Staffordshire)	Irruption of water	8
Apr. 26	Trimsaran (Carmarthen)	Haulage accident (breakage of chain)	10
July 28	Maltby Main (Yorkshire)	Explosion of firedamp	27
July 28	Gartshore (Dumbarton)	Explosion of firedamp	8
Sept. 25	Redding (No. 23 pit) Stirlingshire	Irruption of water	40
Dec. 3	Nunnery (Yorkshire)	Haulage accident (breakage of rope)	2

The death rate at coal mines was somewhat higher than in 1922, particularly in the case of haulage accidents. Outside the Scottish Division, the deaths from this cause were about 50 per cent higher in 1923 than in 1922. The death rate at quarries in the Scottish and the Lancashire and North Wales Division was considerably higher than in 1922.

Table II shows the number of deaths caused by accidents in and about the mines of Great Britain (including those on private branch railways and tramways, and in washing coal) during 1923.

Last year, of the deaths from falls of ground, 392 occurred at the working face, 114 on roads while repairing or enlarging, 75 on roads while otherwise working or passing, and 4 in shafts.

Of the deaths from shaft accidents, 14 occurred while descending or ascending by machinery, 3 by falling into shafts from surface, 24 by falling from part way down, 2 by objects falling into shaft from surface, 3 by objects falling into shaft from part way down, and 12 by other shaft accidents, but no fatalities were caused by overwinding or by ropes or chains breaking.

The deaths due to accidents in haulage operations may be classified as under: Ropes or chains breaking, 11; run over or crushed by trams or tubs—mechanical haulage 105, horse haulage 75, hand haulage 23, runaway trams or tubs 73—total 276; other haulage accidents 25.

The deaths from miscellaneous causes below ground may be subdivided as follows: By explosives, 14; suffocation by natural gases, 7; irruptions of water, 52; electricity, 10; by machinery, 15; other accidents, 62.

Of the deaths on the surface, 21 were due to the use of machinery, 50 to accidents on railways, sidings and tramways, 2 to electricity and 41 to other causes. There were no deaths from boiler explosions.

Table II—British Coal-Mine Accidents in 1923 by Districts

	Explosions	Falls of Ground	Shaft Accidents	Haulage Accidents	Miscellaneous Underground	On surface	Total in 1923	Total in 1922
Scotland	16	62	11	28	65	16	198	180
Northern	2	93	15	32	16	26	204	226
York & N. Midland	37	137	11	63	23	28	299	222
Lancashire & N. Wales	—	64	8	26	18	14	130	110
South Wales	2	172	7	114	20	2	336	270
Mid. and Southern	3	57	6	29	18	9	122	97
Total in 1923	60	585	58	312	160	114	1,289	1,105
Total in 1922	73	551	39	211	125	106

What Is the Relation of Cost of Production To the Price of Coal?

Efficiency of Management, Physical Conditions, Lost Time, Variation in Payments for Royalties and in Amounts for Depletion, Depreciation and Officers' Salaries Among Factors That Cause Wide Range in Output Costs

BY DAVID L. WING
Washington, D. C.

IN DISCUSSING underlying principles there are many things to be said that relate both to anthracite and to bituminous coal, but when the application of these principles is considered it is necessary often to make it clear just which industry and, in the case of bituminous, just which fields are under discussion. Such a variety of conditions exists that it will be found that what appears to be a similar result in two fields may have been produced by widely different causes.

First, let us consider the chief uses for cost-of-production information. These are two: its use to the operator and its use to the general public in its rôle of coal consumer. The practical use of a good accounting system to the operator in the conduct of his business is obvious and need not be stressed here. Events since 1916 have emphasized to the coal operator especially the importance of having adequate cost accounting to meet the requirements of the government.

In addition to the need for such information imposed on all industries to furnish information required for the federal income and excess profits tax, there also has been the special demand for it resulting from the price-fixing policy followed by the Fuel Administration during the war. The need of fixing prices that would sufficiently stimulate the production of coal, without imposing an undue burden on the consumer, made it essential to obtain adequate information on the cost of producing coal in the various mines in the different fields. It is from the standpoint of the public or consumer's interest in cost of production statistics that I wish to call attention to certain conditions of the problem involved. And I wish to emphasize the fact that in describing these conditions I am not advocating any particular method of solution.

WIDE RANGE IN PRODUCTION COSTS OF MINES

Since 1916, as a result of the strenuous career of the coal industry, a large mass of information on the cost of producing coal has been accumulated. For the years prior to 1916, however, little exists. In a paper that I read last November before the American Academy of Political and Social Science, I listed in some detail the various sources where this cost information can be found. One of the most striking facts shown in these statistics is the wide range in production costs found between mines in the same field and between different fields. The "Great American Average," if used with restraint, is helpful for certain purposes, but it certainly is a deadly expedient as often used in the discussions of the relation of costs of production to coal prices. This is because of the extreme range of those costs in a given field.

Relatively few people, outside of those directly engaged in the mining of the industry, realize how great this range is. Some years ago, at my first appearance before one of the several Senate committees that investigated the coal industry almost continuously from 1917 to 1922, Senator Reed, of Missouri, sharply challenged my statement that the costs of production in the Pittsburgh field as shown by reports made by operators to the Federal Trade Commission, ranged, during September and October of 1917, from about one dollar to three dollars per ton. He then instructed me, on my return to the witness stand, to explain "how two coal companies, operating side by side, and selling in the same market, come to have such varying costs, one of one dollar a ton and the other of three dollars a ton." As there may be others who might wish to raise a similar question—one that goes to the root of the subject of price regulation, as well as that of reasonableness of prices, unregulated—I will give you my answer.

PHYSICAL CONDITIONS AN IMPORTANT FACTOR

(1) If mines are not under the same management part of the difference may be due to the relative efficiency of the respective managements.

(2) Physical conditions may be widely different in respect to:

Thickness of seam.

Pitch of seam—whether lying horizontally or at a difficult angle.

Purity of coal in seam—no sulphur balls, etc.

Faults and irregularities of seam.

Character of top and bottom of seam (determining the amount of timbering).

Type of operation, whether shaft or drift, and distance of productive seams from surface.

Drainage necessary.

Ventilation necessary.

Age of mine and character of mining—whether advancing rooms or robbing pillars.

(3) Time lost during month due to:

Car shortage.

Accidents to mine.

Labor troubles or labor shortage.

(4) Variations in payments for royalties and in the amounts of depletion, depreciation charges, and officers' salaries.

My experience, since then, in dealing with cost of production figures leads me to add two other important causes of differences. One is the relative use made in different mines of labor-saving machinery, which is expensive to install but which cuts down the labor cost per ton. Another is the relative amount of preparation that must be given to the coal after it comes from the mine before it can be marketed.

Paper read before the Washington Academy of Sciences, January, 1924.

Now I must present a few figures, but I will be as brief as possible. First, however, a word as to the character of these cost statistics. The figures are the f.o.b. mine costs, compiled from sworn reports submitted by the operators to the U. S. Coal Commission, on monthly report forms prescribed by it. Many of the operators follow different accounting practices, which makes exact comparison of their figures impossible. The Coal Commission did not attempt to revise the cost figures to obtain greater comparability by reconciling different accounting practices. It preferred to use the figures sworn to by the operators rather than make changes for which adequate information on which to base them was lacking. While not 100 per cent comparable, the figures are undoubtedly sufficiently comparable for most practical purposes.

Since I have already mentioned the Pittsburgh field, I will give the range of costs there in 1921. Six per cent of the tonnage was produced at costs ranging from \$1.50 to \$2.20 per ton, and 9 per cent at costs ranging from \$3 to \$4.50, the costs of the remaining tonnage being spread out between those figures. The average cost was \$2.63 per ton.

Turning to anthracite costs, in 1921 it was found that the cost of fresh-mined coal (not including the product washed from the culm banks) ranged from \$3.75 to over \$12 per ton. That was the extreme range. About one-quarter of the entire tonnage cost between \$5 and \$5.50, and of the 12 per cent of the entire tonnage which cost from \$6.25 upward, three-quarters was between \$6.50 and \$7.

These are the facts in regard to the range of costs of production. What relation have these facts to the prices charged by the operators? First, let us consider the uses to which the coal is put. As you know, the matter of market prices of coal is not wholly one of the cost of production—it is the resultant of two forces, the supply available at a given price and the demand for it at that price. It is necessary in measuring different factors often to make assumptions which simplify the complexity of the problem. But in any practical application this complexity must be recognized.

The price that the operator can obtain for his coal depends in part on the uses to which it can be put—for example, in metallurgy, for making gas, for blacksmithing, for fuel in households, apartments and office buildings in cities, for making steam for manufacturing or transportation. Also, do not forget that the operator's price is influenced by the availability to consumers of suitable coal from other fields or of other forms of fuel.

Now, what is the bearing of the wide range of costs in the matter of price fixing? Given an emergency such as rose in the summer of 1917, which caused the passage of the Lever Act and the establishment of the Fuel Administration, it becomes necessary to establish an artificial relationship between the cost of production and the operator's price. At such a time the demand for all fuel is so insistent that much of the effect of particular uses on price just described can be disregarded, because all the coal that can reach the

consumer is not sufficient to meet the demand for the use in which it meets most competition—that of making steam.

By governmental authority there is fixed an artificial limit of the maximum price which the operator in a field is permitted to charge. These field prices have to be fixed with relation to the costs of production in that field. The course the price fixer must steer lies between the Scylla of discouraging necessary production and the Charybdis of placing undue burdens on the consumer.

At such a time, in the attempt to fix a reasonable limit for maximum prices, the wide range of costs of production in a given field assumes great significance. The very conditions that have brought about the emergency requiring such action have already submerged, for the time being, the natural regulation on prices caused by the free play of competitive forces. These, under normal conditions, regulate through the changes of supply to demand.

The wide range of costs enters the problem through the need of using as a price-fixing base not the average cost in a field but a cost above the average. Otherwise the production of too large a proportion of that half of the coal tonnage produced at a cost above the average will be checked. During the war the following plan was adopted in fixing maximum

coal prices: The first bituminous coal government prices were fixed by President Wilson's proclamation of Aug. 21, 1917, before the establishment of the Fuel Administration.

There was then in the possession of the Federal Trade Commission fairly reliable typical costs of production for nearly every important bituminous field east of the Mississippi. These costs were almost all in the form of what I may call average high and average low for the fields—what really amounted to ranges of the costs grouped around the 25 per cent and 75 per cent points of a percentage scale of costs ranging from low to high. They did not indicate the extreme ranges of costs. By President Wilson's direction, I applied the margin of 25c. per ton, which he decided was a fair margin, taking into consideration the conditions at that time, not to the *average field cost* but to the *higher cost*, which in most cases worked out at about the 75 per cent mark.

Later, under the Fuel Administration, the Engineers' Committee, using the thousands of detailed monthly cost reports made by the operators to the Federal Trade Commission as a basis, after a careful study divided up the original price-fixing districts, and established for each price-fixing district their so-called "bulk line cost," which was a price basis established at the 80 per cent mark. To this base line the margin which Dr. Garfield approved for that field was added, to obtain the field price.

In both cases it was necessary to take into account the wide range of costs and to establish field maximum prices which returned to some of the lowest-cost mines enormous profits (subject, of course, to the income and excess profits tax), while some of the high-cost produc-

THE matter of the market price of coal is not wholly one of the cost of production—it is the resultant of two forces, the supply available at a given price and the demand for it at that price. It is often necessary in measuring different factors to make assumptions which will simplify the problem. But in any practical application, the complexity of this question must be recognized.

tion, which had been stimulated by the runaway market prior to price fixing, was eliminated. The loss of this high-priced tonnage, however, was more than made up by the increased production of the lower-cost mines, stimulated by their large profits and helped by more adequate transportation facilities.

It must be borne in mind that the crisis which brought about the price regulation in 1917 was primarily caused by the inability of the coal to reach market, not by the lack of mining capacity or mining labor to produce coal enough to satisfy the abnormal demand.

A word about margins is necessary. The margin to which I have referred in connection with price fixing is not strictly a margin of *profit*. It is the figure which is obtained by subtracting the average per ton cost f.o.b. mine from the average sales realization received by the operator for all his tonnage sold during the period under consideration—month, quarter or year. From this margin must come federal taxes and interest on borrowed money, before the amount available for the owners of the business—profit in the sense commonly used—is known. Even then it cannot be translated into terms of per cent return on the investment until the investment per ton is known. And obviously this investment varies widely from operator to operator.

LABOR-SAVING MACHINERY LOWERS COST PER TON

Take, for example, two operators operating side by side under similar mining conditions. One operator uses pick mining and mule haulage; the other has a mine well equipped with mining machine, loading machines and electric haulage, all devices which cut down the amount of human labor involved in mining a ton of coal. The first operator will show a high labor cost per ton—because he uses human labor to hew down the coal, to load the mine cars, and to haul these cars with mules which require the guidance of many mule drivers. This means, of course, a much larger sum paid in wages for an equal output of coal than is paid by the operator who has the heavy investment in labor-saving machinery.

Under the accounting rules, the expense of the labor goes into the cost of operation. The cost of investment in labor-saving machinery, however, does not show in the cost of operations to any such extent. It is reflected in a relatively slight degree in the depreciation charge, that is, the allowance for the wearing out of all equipment in order that a fund can be accumulated for its replacement. But no allowance enters into the operating cost for the use of the heavy capital investment; no return on the money tied up all this time in this expensive labor-saving equipment. Thus the first operator might show a small margin because of his high cost brought about by his lavish use of human labor, while the second operator might show a large margin, due to his use of labor-saving equipment. And yet their ultimate return on the money invested might be the same. In any comparison of costs and margins these factors must be taken into account.

A word about the relation of large margins to high prices. It is true that in many cases individual operators have obtained large margins by obtaining prices far in excess of the average market prices. But it is equally important to remember that both in the anthracite and in the bituminous industry, operators also are to be found who have sold their output at prices below the average for the field and yet have obtained mar-

gins much in excess of the average margins for the field, whether considered in cents per ton, per cent of sales realization, or f.o.b. mine cost. The explanation lies in the low costs of such operations, due either to the natural conditions of their mines or to their heavy investment in labor-saving equipment. As concrete illustrations often are of more value than much generalization, the following may be of interest:

In a certain tabulation made for the Calder committee, and presented at the hearings before the La Follette committee—both Senate bodies investigating the coal situation—there appear for certain operators figures showing their investments, costs, sales realizations and margins during 1920. I wish to call attention to the figures of two of these operators, both in the Smokeless field in West Virginia. For the 21 operators shown, the average investment per ton was \$3.83, the average cost for the first 9 months of 1920 was \$2.87, sales realization \$4.64, and margin \$1.77 (which was equal to 62 per cent of the cost). The extreme range of margins shown for these 21 operators, all of whom had an annual production exceeding 100,000 tons, was from 56c. to \$3.90. They had been selected for the tabulation because of their relatively large margins between June and September, 1920.

Operator No. 1 had a production of about 370,000 tons per year (a cost of \$2.03, a sales realization of \$3.44, and a margin of \$1.41). His sales realization was 26 per cent below the average of the 21 operators, yet his margin was 69 per cent as large as his cost, as compared with 62 per cent, the average for the 21 operators. His investment per ton was \$6.07, as compared with the average of \$3.83, and his rate of margin received to investment was 21 per cent, as compared with the average of 47 per cent.

HIGH MARGIN NOT ALWAYS FROM HIGH PRICES

Operator No. 14 was a producer of about 250,000 tons per year. He showed a cost of \$2.01, a sales realization of \$4.22, and a margin of \$2.21. His sales realization was 9 per cent below the average of the 21 operators, yet his margin was 110 per cent as large as his cost, as compared with the average of 62 per cent. His investment was \$3.57 per ton, as compared with the average of \$3.83, and his rate of margin received, to investment, was 92 per cent, as compared with the average of 47 per cent.

It should be remembered that these 21 operators were picked on the basis of large margins shown for the four months of 1920 when a runaway market was at its height. Their figures are not necessarily typical of the whole field. For this Smokeless coal region, the Federal Trade Commission published 1918 costs for 176 operators, and the Coal Commission, for 1921-22, costs for 144 operators. But the example I have given illustrates the fact that high margin does not necessarily imply that it is derived from charging prices above the average level. And there are cases in anthracite as well as in bituminous coal where a sales realization that produces a relatively high margin actually is *below* the mine cost of a substantial part of the production of the field.

In closing I wish to emphasize the fact that in proportion as accurate and comparable information on costs and investments becomes available, it will be possible to ascertain more surely the relationships that should exist, for the welfare of the industry and the consuming public, between costs, profits and prices.

News Of the Industry

Castlegate Blast Due to Contact of Gas With Open Light, Says Preliminary Report

Fireboss Believed to Have Attempted to Remove Firedamp from Room—
Not a Man Survives—All but One Body Recovered—
Compensation May Cost \$700,000

Special Dispatch to Coal Age

Salt Lake City, Utah, March 17.—It is estimated that the Utah Fuel Co.'s Castlegate disaster will cost \$1,500,000 in compensation, repairs to mine, labor in recovery of bodies of victims and loss in operation during the next month. The compensation is now placed at \$700,000 instead of at \$1,000,000. The figures given are a rough estimate.

According to a statement issued by a joint committee of federal, state and company mine officials, following a preliminary and far from complete examination of the mine, the explosion appears to have been caused by the attempt of a fireboss to remove a small amount of gas from No. 2 room of the sixth left dip entry on the morning of the explosion. It was stated that indications found in No. 2 room of this entry pointed to the fact that gas had come in contact with an open light, immediately exploding, sending a wave of intense heat throughout the underground workings, which ignited other smaller bodies of gas, killed the miners and sent air rushing toward the main portal with such velocity that it was completely wrecked and pipes and timbers blown clear across the canyon.

To Seek Cause Definitely

Efforts will be made to trace the cause of the disaster more definitely, but following a day spent in the workings, Daniel Harrington, U. S. Bureau of Mines; B. W. Dyer, chief mine inspector; John Crawford, coal mine inspector, F. N. Cameron, vice-president and general manager of the Utah Fuel Co., and R. M. McGraw, superintendent, the above statement was issued. The report adds that all precautions appear to have been taken, that the rooms were well sprinkled, and that it will be some time before a definite decision can be made.

But one body now remains in the mine, and efforts to recover it are being continued.

More than 200 men trained in rescue work were gathered from mining camps within 30 miles of Castlegate on the day of the explosion. All sorts of obstacles hindered them. The mouth of the slope was choked with debris, there were many roof falls, and such volumes

of gas, soot and water were encountered that the first three days' heart-breaking labor, during which George Wilson a member of the Standard Coal Co.'s rescue team of Standardville, Utah, was asphyxiated, produced only 57 bodies. Day by day other bodies were brought out by the score until last Saturday when the total had reached 168. It was concluded by that time that the total number in the mine was 171 instead of the earlier estimate of 173, and that, therefore, only three more were to be found.

Although many of the bodies were mutilated beyond identification, some were found with watches ticking in their pockets. This apparent miracle is explained by a company official who thinks the jar of picking up the bodies would be enough to start a watch that had been stopped by shock. In many

cases, watches stopped at the exact moment of the explosion. By the end of last week, of course, the earlier hysteria in Castlegate had been succeeded by that funeral silence which always settles down over mining camps after such appalling shocks. Interment of dozens of men daily became a simple ceremony. A great ceremonial of sorrow, however, is planned for a day two weeks hence.

The first movement to raise a relief fund throughout Utah has been stopped. There appears no need for it. The company, which is a self-insurer under the law, expects to pay out about \$1,000,000 in workmen's compensation to the survivors.

Moderate Property Loss

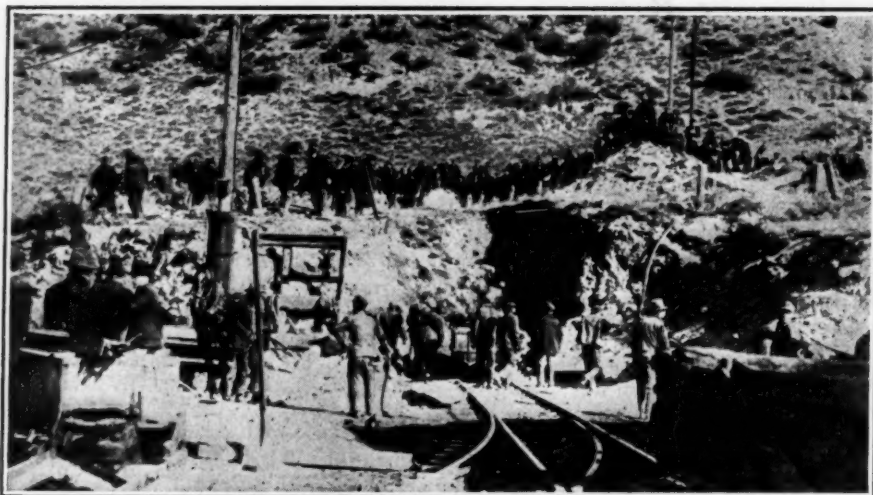
The property loss to the company is said to be moderate, considering the fearful force of the blast. Many entries must be cleared, water lines and tracks relaid, some debris removed, and the mouth of the slope rebuilt, but outside of that the rehabilitation of the mine may not be extensive. While part of the fan house was blown out, the fan itself is said to be in easily repairable condition.

The main hoist also was damaged. A quantity of coal at the entrance of the mine was partly coked by the fierce



Hole Torn in Mountainside by Force of Explosion

Where one of the workings came near the surface the blast blew aside the light cover making an opening to the mine. The force was so terrific that not a single man in the mine lived to tell the tale. Fortunately the mine is so located with regard to the tippie that the men at work on the outside were not injured.



Rescue Squad Entering Castlegate Mine

Plenty of evidence of violence can be noted. Telephone and electric light poles, timber and pipes were blown across the valley, which is almost a mile in width. The second explosion blew a wall out of the fanhouse and the third partly wrecked the office building of the company.

blast which swept through the workings. Small fires were started in gob piles at various points underground but these have all been extinguished.

The dust in No. 2 mine of the Utah Fuel Co., at Castlegate, has been recognized as "the most abominable to contend with that has yet been tested by the Bureau of Mines." William Littlejohn, general superintendent of the company's operations, told the Rocky Mountain Coal Mining Institute about it at the February meeting of the Institute, in Denver. The danger of it, he said, was so grave that ironclad rules of protection against it were rigidly enforced in the mine. As this was written, nothing definite was known as to the part that dust played in the fearful tragedy of March 8, but Mr. Littlejohn's discussion of it, voiced three weeks before the explosion, is interesting.

Drench Places Before Shooting

Mr. Littlejohn said rules required that every working place be drenched before shooting. If a miner failed to do this, the shotfirer would refuse to shoot the place, he said. The use of permissible powders in the mine has caused enough flame to fire both the dust and gas feeders, he said. So precautions are taken against both. Here is a transcript of part of Mr. Littlejohn's discussion of a safety paper at the Institute meeting:

"It is my opinion there is no such thing as 'flameless powder.' We are using what is termed 'permissible powder' exclusively, and I know personally, having visited some of our working places and seen some very marked indications of the igniting of feeders by flame after shooting that permissible explosives do flame. We have two mines in our operations where we have to get the inspectors to go back and examine the working places for feeders.

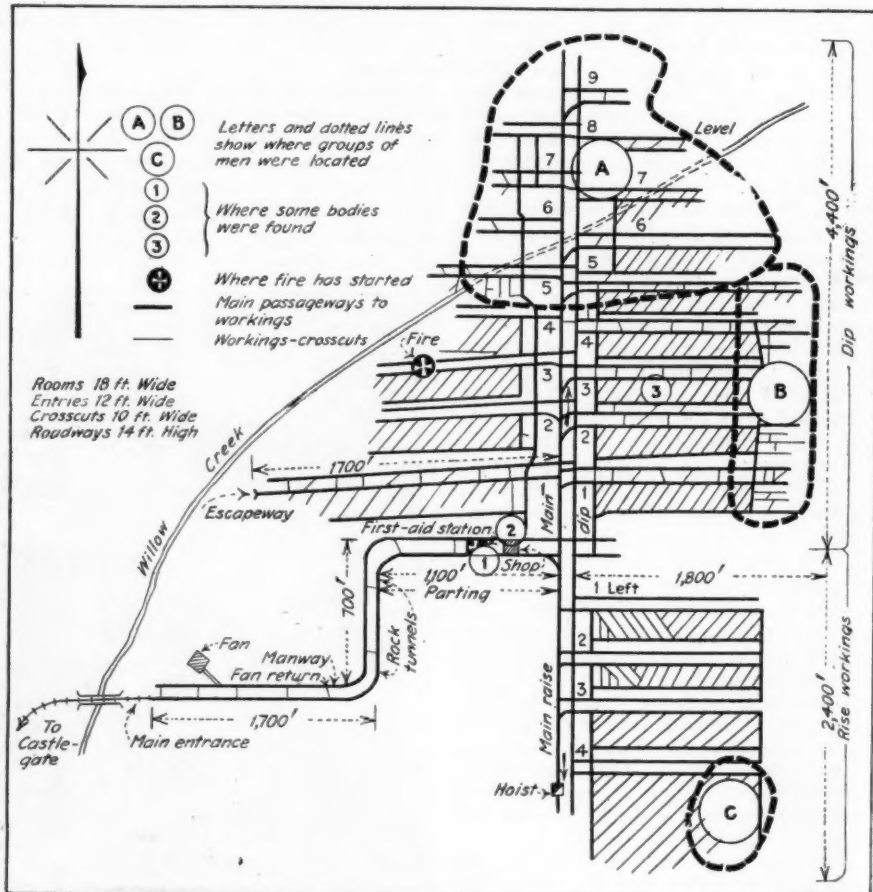
"It was an examination of No. 2 mine at Castlegate which caused us to change our methods. We found an entry which had been cut, drilled and sumped ready to shoot. When the shot inspectors returned after firing shots in this place they detected a strong

odor of burning. They sent for me and I went down there and made a personal examination. The whole situation was just as plain as daylight. We had eight shots, four in the entry and four in a crosscut. Unquestionably the four shots when they went off in the entry ignited dust. Unfortunately,

there was a shot right in the crosscut and evidently a tongue of flame projected and met the dust coming back from the face and ignited it. We got very distinct traces about 65 ft. back from the face. Fortunately, our mine was well sprinkled and it prevented a conflagration.

"We have a hard and fixed rule. Every miner must sprinkle his place. He is provided with a hose for this purpose. We have a strict rule and we live up to it. I want to say that we have—brother Harrington [Bureau of Mines' engineer] tells me—the most abominable dust to contend with that has yet been tested by the Bureau of Mines. If a miner goes home at night without sprinkling his place, the place is not shot. The shot inspector's instructions are to disconnect and don't shoot."

Mr. Littlejohn explained that he and several other mining men had devised sprinkler cars, two of which are regularly used in No. 2 mine. Each of these is a 1,200-gallon tank with a force pump and an arched pipe in front. The perforated pipe which throws the water is so arranged, he said, that roof and ribs are well washed down and even crossbars are soaked. "We sprinkle sides and roof regularly," he finished. "Mr. Harrington can tell you our sprinkling regulations are favorably known."



Skeleton Map Shows Where Men Were at Work When Explosions Occurred

The mine was developed according to the most up-to-date methods and every precaution except stone dusting was tried. The management at the mines initiated for America the practice of using non-combustible tamping and shooting coal electrically from a point outside the mine. It will be said that "another model mine has exploded"; but with this mine there is this difference: The management knew that it had a dangerous coal to deal with and that the air in the mine was so dry as to soak up water like a sponge, and consequently was never any too confident but was always looking around for additional means of protection.

District No. 2 Indorses Brophy Report In Stormy Convention at Altoona

About the only thing accomplished in the first five days of the convention of District No. 2, United Mine Workers which assembled in the Mishler Theater, Altoona, Pa., on Tuesday, March 11, and adjourned at noon on March 15 until Monday, March 17, was the indorsement of President John Brophy's policy relative to continuing the strike up to August, 1923, in the Somerset district, the threshing out of the controversy between President Brophy and T. D. Stiles, editor of the *Penn Central News*, and an address by Philip Murray, International vice president of the miners' union.

The controversy started over prolonging the strike in the Somerset region. Mr. Stiles took issue in his journal with the president on the policy he was pursuing, with the result that an injunction was obtained in the courts, tying up the labor paper and its business. When Mr. Brophy submitted his report, an open battle was waged, during which President Brophy, Vice President Marks and Mr. Stiles in turns engaged in a wordy battle which ended on Friday evening, when, by an almost unanimous vote of the delegates, Brophy was upheld in his stand.

Four hundred miners employed by the Vinton Colliery Co., at Vintondale, went on strike against a wage reduction and organized a local union on Monday. Brophy sent a telegram to Governor Pinchot requesting him to prevent eviction of miners from company houses. Educational and co-operative store movements occupied the attention of the convention Monday and Tuesday aside from a renewal of Stiles' defense of the *Penn Central News*.

Local Union No. 861, of Cresson, sent a resolution to the convention demanding impeachment of President Brophy, John Ghizzoni and John Kerr, who were responsible for the issuance of the injunction against the *Penn Central News*. This resolution went down when the convention accepted the Brophy report.

Miners at Marsteller sent a resolution which read: "Sign no scale agreement with the operators unless they agree to abolish the car push in District No. 2, said agreement to become effective not later than six months after said scale is signed." This will be considered at the conference with the operators on March 20.

It was decided to meet with the operators of the district in Philadelphia, instead of Altoona, on Thursday, March 20. Following are the men elected as members of the scale committee:

Territory 1, William Welch, Nant-y-Glo; Patrick McDermott, Hastings; territory 2, Harry Crago and H. E. Johnson, Philipsburg; territory 3, David Cowan, Portage; Faber McCloskey, Gallitzin; territory 4, Arthur Tayler, Robertsdale; Leonard Cleves, Defiance; territory 5, Herman Carletti, Punxsutawney; James Mottey, Elenora; territory 6, Peter Ferrara, Indiana; James McCarthy, Chambersville; territory 7, William Aekley and J. P. Nelson,

Madera; territory 8, Tony Badiala and D. P. Kirk, New Bethlehem; territory 9, S. J. Hudvinski, Morris Run, and J. G. Haskins, Blossburg.

In his address before the convention, Vice-President Philip Murray emphasized the importance of maintaining contractual obligations.

"We believe that a three-year contract will do much to stabilize the mining industry and that it is the best wage contract that has ever been adopted, both for the miners and for the industry," is the way Mr. Murray put it in speaking of the Jacksonville agreement. He declared that many new operators have come into the industry in late years, with the result that the industry is economically unsound and marked by cut-throat competition, with wage reductions in the non-union fields. He said: "Many of these operators are unable to pay their men and failures among them are frequent and they have thrown the whole industry out of gear."

The report of Secretary Richard Gilbert was a voluminous affair, every item being of interest to the miners of the district. The report shows a membership in the district of 42,799, a decrease of 6,974, due, he said, to conditions in the Somerset field. There are 235 local unions, a decrease of 25. The tax paid in 1923 amounted to \$1,108,892.98, while assessments totaled \$661,170.26. There was paid out in strike donations from April, 1922, to December, 1923, \$1,326,809.87.

The number of checkweighmen employed during the year was 412, and the amount of wages paid was \$498,711.63. Death claims were paid for 424 members and 232 widows or widowed mothers to the amount of \$108,000.

The receipts from all sources during the year, including the balance from 1922, were \$1,909,873.28, and the expenditures were \$1,542,348.63.

To Discuss Mine Problems at A. I. E. E. Convention

The spring convention of the American Institute of Electrical Engineers, to be held at Birmingham, Ala., April 7-11, will devote a session on April 10 to coal-mine problems. The papers to be read and discussed at this session are as follows: "Electrical Safety in Coal Mines," L. C. Illsley, U. S. Bureau of Mines; "Automatic Substations for Mines," C. E. Von Sothen, General Electric Co.; "Tests on Mine-Hoist Control," F. L. Stone and F. R. Grant, General Electric Co.

Sign 3-Year Agreement In Washington State

The union operators in the State of Washington and the United Mine Workers agreed Saturday, March 8, to a renewal of the existing wage contract for a period of three years from April 1, 1924.

British Miners Reject 10 per Cent Wage Rise; Ask 20 per Cent Advance

Delegates representing 750,000 British coal miners have unanimously rejected the mine owners' offer of an increase of 10 per cent in the minimum wage, which would be 30 per cent above the 1914 level, demanding an advance of 20 per cent in the present scale. Negotiations have been broken off and the Miners Federation will concentrate its efforts on the labor government and Parliament to obtain accession to their demands by means of the minimum wage bill which will come before Parliament March 21. If this move does not meet with success the miners' delegates will assemble on March 26 to decide on a ballot for a nationwide strike of coal miners.

Wage Troubles Vex Eastern Kentucky Fields

It is reported from Whitesburg, in Letcher County, eastern Kentucky, that there have been some sweeping reductions of 20 per cent posted in wage scales in the greater portion of the Elkhorn or northeastern Kentucky coal territory. Louisville coal men assert that there has been a lot of rate reducing in eastern Kentucky, until it is uncertain as to whether wages are now at the 1917 wage scale or below. Indications are that some of the non-union districts are below that figure.

Southeastern Kentucky, which is not fully unionized, has balked on signing a three-year contract, or operating on the present wage scale, feeling that it is suicide to do so in view of the competition from the eastern and northeastern sections of the state, where the most powerful combinations are located. The non-union sections of eastern Kentucky also are largely responsible for the feeling of western Kentucky in opposition to a three-year scale or renewal at the 1919 basis.

Deadlock in Wage Parley Of Western Kentucky

Apparently there is a deadlock between committees representing District 23, United Mine Workers, in western Kentucky, and the Western Kentucky Coal Operators' Association, in the conference at Louisville to draw up an agreement to take the place of the one expiring on March 31. The miners, it is said, are holding out not only for a renewal of the expiring two-year scale agreement but for a three- or four-year agreement at the existing scale. The operators want a reduced scale and a contract of not more than one year, or two years at the outside, it is said.

Operators assert that with the non-union fields running coal freely, and adverse traffic or freight rate conditions, the western Kentucky field is at a disadvantage, and can't successfully pay the Central Competitive scale of 1919 and operate. The union leaders, it is said, are holding firmly.

The meeting began on March 11 and adjourned on March 14, to resume on Tuesday or Wednesday of this week.

Agreement Near at Baltimore

Agreement on a wage scale seems near between the Northern West Virginia Coal Operators' Association and the United Mine Workers as *Coal Age* goes to press. The conference, which began March 11 at the Southern Hotel, Baltimore, adjourned March 15, to meet again March 19.

George S. Brackett, vice-president of the operators' association, said the joint subcommittee had reached an agreement on many disputed points on working conditions on Saturday morning. At the conference on Wednesday it is expected that the subcommittee will be ready to submit its report, when it is hoped that an agreement will quickly be reached.

Judge Williams Advises Issue Of Trade Statistics

The essentiality of the trade association and of trade statistics was pointed out in an address by Nathan B. Williams, associate counsel of the National Association of Manufacturers, at the annual convention of the Refractories Manufacturers' Association at St. Louis, March 19. Among other things, Judge Williams said:

"Trade associations are tools of industry. There are those who would outlaw them. Being tools of industry, they must be kept in condition to perform their proper and useful functions.

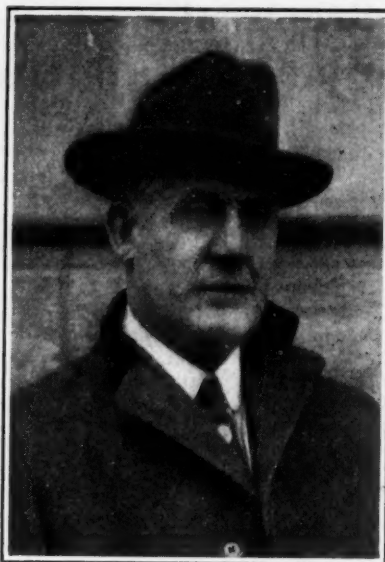
"The trade association is the primary source for accurate information respecting a particular industry or trade. By means of the association not only is the industry and its constituent elements informed but the public as well is made aware of that essential information which must necessarily be known in order that both business and government may function successfully. The trade association is the legitimate, the obvious and the fundamental agency to gather, prepare and disseminate this information.

"The collection and publication of unidentified current trade statistics are not unlawful. Trade statistics and other trade information may be misused, and when so misused, subject those who perform such illegitimate use to the pains and penalties of the laws in such cases made and provided.

"In my judgment legitimate trade associations should continue their statistical and other activities without reference to the correspondence between the Attorney General and the Secretary of Commerce, and in conducting their activities be careful not to transgress the well-known inhibitions of existing law, in that they not misuse their statistical and other trade information in promotion and furtherance of any agreement or conspiracy to fix prices, limit production, restrict sales, divide territory, or otherwise restrain lawful competition in commerce.

"Accurate and complete cost accounting is vitally necessary to all business, not merely as a guide to business conduct but in complying with state and federal income tax laws.

"Government is but the organized expression of the intelligent judgment of the citizen. The trade association should be the means, the opportunity,



Alexander Howat

Indicted and imprisoned for calling a strike. U. S. Supreme Court refused to accept Mr. Howat's plea that Kansas had no right to pass the Industrial Relations Court Act making coal mining an essential industry.

and the vehicle for such expression. In just the degree that those who have most at stake in society, most to be preserved by orderly, reasonable and intelligent government, see to it that that government measures up to the requirements demanded in the successful conduct of business enterprise, will our institutions and security be protected and our institutions, social, political, and industrial, be promoted and preserved."

British Mine Safety Expert Studies Coal Industry Here

Dr. R. V. Wheeler, who is in charge of the British government's research dealing with safety in coal mines, is being given some impressions of the American coal industry on a trip arranged by the Bureau of Mines. He is accompanied by George S. Rice, chief mining engineer of the bureau. The limited time at Dr. Wheeler's disposal necessarily has made the trip a hurried one.

Dr. Wheeler, Mr. Rice and members of their party were entertained at a luncheon in Chicago March 11. The day following was spent at the bureau's station at Urbana, Ill. March 13 and 14 were spent in inspecting mines in the region near Benton, Ill. St. Louis was visited on March 15. The party reached Detroit March 17 and visited the lead bath process at the Ford plant and inspected some of the processes of the Combustion Engineering Co. The remainder of the party's itinerary is as follows: March 18, Niagara Falls; March 19, Schenectady; March 20, Scranton; March 21, Wilkes-Barre; March 22, conference in Washington at the U. S. Geological Survey on the constitution of coal and its microscopic examination; March 23, Washington; March 24, 25 and 26, southern West Virginia; March 28, conference in New York with Dr. R. B. Moore and at the Trent process plant. Dr. Wheeler will sail March 29 on his return to England.

Trade Commission Authority Limited, Says Supreme Court

The Federal Trade Commission has no authority to demand all documents and papers from a corporation in an effort to obtain evidence of unfair practices but must confine its demands to such documents as are evidence, the U. S. Supreme Court held March 17 in a decree which further restricts the commission from so-called "fishing expeditions" into business.

The decision, which was read by Justice Holmes, was in the appeals of the commission from decisions of the district courts in sustaining objections of the American Tobacco Co. and P. Lorillard Co., Inc., to obeying a general order of the commission to produce "all records, contracts, telegrams," etc., in connection with tobacco purchases and sales in 1921. The order was in response to complaints lodged with the commission and also in response to a Senate resolution directing an inquiry by the commission into tobacco sales and other affairs, with particular reference to prices paid producers.

In its decision, the Supreme Court, upholding the action of the lower courts, said:

"It is contrary to the first principles of justice to allow a search through all the respondents' records, relevant or irrelevant, in the hope that something will turn up. The right of access given by the statute is to documentary evidence—not to all documents but to such documents as are evidence. The analogies of the law do not allow the party wanting evidence to call for all documents in order to see if they do not contain it. Some grounds must be shown for supposing that the documents called for do contain it."

"The investigations and complaints seem to have been only on hearsay or suspicion—but even if they were induced by substantial evidence under oath the rudimentary principles of justice that we have laid down would apply. We cannot attribute to Congress an intent to defy the Fourth Amendment or even to come so near to doing it as to raise a serious question of constitutional law."

The opinion did not discuss whether Congress could go this far if it tried.

Johnson Immigration Bill Reintroduced in House

The Johnson Immigration bill was reintroduced in the House of Representatives at Washington March 17, retaining the 1890 census as a basis for a 2-per cent quota, but otherwise revised to meet the suggestions of Secretary Hughes relative to treaties and administrative features. By retaining the 1890 census the Japanese clauses remain unchanged.

As the 3-per cent quota law will expire June 30, enactment of permanent legislation is hoped for before adjournment, which is expected about June 1. Hearings before the committees of both houses of Congress have dragged for so long, however, that its enactment has seemed seriously threatened.

Rapid Growth of Interconnection of Power Means Much to Coal Industry

Studies Prompted by Secretary Hoover Reveal Amazing Progress in Linking Up of Electric Lines—Ruling in Industrial Court Case May Have Far-Reaching Effect

By PAUL WOOTON
Washington Correspondent of *Coal Age*

Special studies being made of the superpower situation at the instance of Secretary Hoover reveal that the progress in interconnection of electric lines is proceeding at an amazing rate. The extent to which interconnection has been taking place has not been appreciated entirely because this is the first time that data covering this situation throughout a large area have been brought together at one place. The information submitted by the states has been combined with that of the federal government and mapped. These maps, which are being prepared by the Federal Power Commission, are destined, it is believed, to be the focusing point of a large amount of attention during the next few months.

The rapid trend toward interconnection has an important bearing on the coal industry. Its chief importance unquestionably is that it is making for consolidations and concentrations within the industry, which is moving more and more rapidly toward a vast public service. The ruling of the Supreme Court of the United States in the Kansas Industrial Court case has an important bearing in that connection. In that decision, the court implied that the only kinds of businesses in which the state may step in and compel arbitration, the acceptance of awards and other drastic forms of regulation are those universally regarded as public utilities. The next few years, in the opinion of high authority in Washington, is certain to show great integration of coal mining and power production. If this does not result in outright ownership, it will be effected by the strongest types of contracts.

The survey now in progress shows that the great electric utilities are pushing out their lines with great rapidity and are displacing large numbers of steam plants operated as a part of the individual establishment. It already is indicated, according to the engineers who are studying this problem, that some day in the future the great service of supplying power will be located largely in great plants as near the source of coal supply as a supply of condensing water will permit. The great agencies which will distribute this power are not going to invest millions of dollars in steam plants without insuring themselves absolutely as to coal supply. The steel companies have long followed the policy of purchasing reserves of coke and coal. It is certain that these great central stations are going to safeguard their supplies of steam coal in much the same fashion. In that connection it may be remarked that the study of interconnection has progressed far enough to indicate that chief reliance in the industrial area of the Atlantic

seaboard must be placed on electricity generated at steam plants.

With enormous pools of power in concentrated ownership and with the bituminous-coal deposits in the hands of relatively few interests, it is obvious that coal will be brought more and more into the class specified by the Supreme Court as being properly subject to regulation.

Dorcy Decision Significant

Since the Kansas Industrial Court case has such significance to the coal industry, it may be well to point out here that the court's decision on March 10 in the case of August Dorcy versus the State of Kansas is in no way a reversal of the position taken in the Kansas Industrial Court case. The industrial court case was decided last June. In that decision the Supreme Court held that the scheme of compulsory arbitration in essential industries is unconstitutional on the ground that to fix wages or prices of products is a deprivation of the right of contract guaranteed by the Constitution. In that decision, the court made the famous parenthetical statement that since the adoption of the Constitution "it never has been supposed that the business of the mine operator or the miner was clothed with such a public interest that the price of his product or his wages could be fixed by state regulation." It then went on to imply that an industry must be absolutely in the public-utility class before it could be subject to regulation and that when capital or labor enter such public-utility services they give an implied pledge for continuous service.

Before that decision was handed down, August Dorcy and Alexander Howat had been put in jail by the Kansas Industrial Court for having called a strike at a Kansas coal mine. The case was appealed by the union to the Supreme Court of Kansas. That tribunal upheld the state law. The union then appealed to the U. S. Supreme Court. All of this took place, however, before the Supreme Court's decision in the Kansas Industrial Court case. The Supreme Court of the United States realized that the decision of the Supreme Court of Kansas would have been affected had its opinion been available when the Dorcy case was before it. All that is done in the Dorcy case is to return it to the Supreme Court of Kansas so that that tribunal may have an opportunity to pass on it in the light of the Supreme Court's action in the preceding case.

The language of the decision can be construed to mean that the state court may still hold that the Kansas Industrial Court has the power to jail a man for inciting a strike even though it has not the power to compel arbitra-

Miner to Represent King At Holyrood Castle

The British Government has decided to appoint James Brown, Socialist member for South Ayrshire to the post of Lord High Commissioner to the General Assembly of the Church of Scotland. Brown, who is a coal miner, will leave his £10-a-year cottage to dwell for a few weeks each year in historic Holyrood Castle, home of the royal Stuarts. Royal salutes will be fired in his honor, and his wife, a former mill girl, will be addressed as Your Grace. And when it is all over they will go back to their cottage of two rooms and kitchen.

For two and a half centuries the post has been held by the Scottish nobility. It is the duty of the Lord High Commissioner to act as representative of the King during the General Assembly of the Church of Scotland and to occupy the state apartments of Holyrood Palace during that time.

Whether the state court will insist on its former view, in spite of the Supreme Court's decision, remains to be seen. So far as the layman can penetrate the mysteries of the legal mind, it seems apparent that the Supreme Court still believes that the production of bituminous coal is not a public business and that the public cannot interfere to fix the price of the commodity or to compel men to cease striking. Whatever the court may have said about the relatively unimportant mines of Kansas probably would not be repeated were it dealing with a great service of coal and power such as those toward which we are headed in the North and East. The opinion is held in impressive quarters that regulation must be taken into account as we trend toward superpower.

Michael F. Burns Resigns From Coal Company

Michael F. Burns, president of Burns Brothers Coal Co., of New York City, and head of the company since its organization, retired from the corporation March 12, when he presented his resignation to the board of directors, effective April 1. A special meeting of the board of directors of the company was held March 18, when Mr. Burns was asked to reconsider his action.

Differences of opinion regarding the management of Burns Brothers' affairs are understood to have existed since an attempt was made last year to nationalize the company by expanding its operations to other cities. This failed at the time, but it is believed that it may be taken up again should a new president be elected who is friendly to the interests not overfriendly to the present management.

Frank L. Burns, a son of M. F. Burns, is still with the organization.

Brydon Urges Legislation Against Labor Monopoly

Addressing the League for Industrial Rights, at the Waldorf-Astoria, New York City, March 7, on "The Trend of Labor in the Coal Industry," John C. Brydon, president of the National Coal Association, traced the growth of the United Mine Workers, paying particular attention to that organization's course toward militancy.

"The change from craft unionism to industrial unionism, the abandonment of the principle of arbitration of industrial disputes, and the increasing denial of the rights of capital, operating as they do, not in the coal industry alone but in the American Federation of Labor as well," said Mr. Brydon, "are dangerous.

"The institutions of this country have always been hostile to the existence of monopoly, whether of capital or of labor. Any system which has for its object the setting up of a monopoly of labor, subject to no control other than the whims of its politically chosen leaders, and which denies the right to work to any man who does not subscribe to the tenets and contribute to the funds of that organization, is an anomaly in the American scheme of things. It is toward this goal that unionism in the coal industry is tending, and I think you will agree with me that this is a most unfortunate circumstance.

"Abolition of the United Mine Workers would be a serious mistake. I believe in the right of man to organize and bargain collectively, provided they can find employers who will contract with them in that manner. I also believe that an individual has the right to stay out of an organization and has the right to work under such conditions if he chooses, and I believe further that the employer has the right to choose whether he will contract with the union or not.

"The best solution of the problem is by the effective force of public opinion, which will outspokenly condemn these undesirable developments.

"There are at least two lines along which the force of this aroused public opinion should make itself felt. In the first place, it should insist upon such legislation as will make the United Mine Workers legally responsible for living up to their contracts. At the present time the scale contracts in the coal industry really bind only one party, the operator; and there is an almost unbelievable record of strikes in violation of contract. If the United Mine Workers are to be allowed to continue to make wage contracts for 60 per cent of the bituminous coal industry, they must be made to live up to those contracts.

"In the second place, if the miners' organization is to continue to wield the vast power which results from nationwide combination, it must be made to recognize the principle of arbitration. The expiration of wage contracts must not be a signal for the employment of the tremendous economic power of that combination against the public. If such combination is to be permitted, it is essential from the standpoint of the

Label: Laugh Here

The pre-prohibition story about how he put whiskey in a fan water gage to keep it from freezing was not the only funny one E. H. Weitzel, general manager of the Colorado Fuel & Iron Co., told the Rocky Mountain Coal Mining Institute at its February meeting. There also was the one about the mine boss who was having trouble at home and who decided to "take her some flowers and call her 'dear' again." He did. She misunderstood. "Ain't it enough for Mabel to skin her leg and Mary to take the measles and the soup to burn today," she bleated, "without you comin' home drunk?"

public interest that it carry certain limitations. Chief of these limitations must be the recognition of the principle of arbitration as a means of settling industrial disputes. An aroused public opinion can bring this reform about; and it must be brought about, if the interest of the public is to be protected."

Strike Looms in Alberta

Negotiations on a new wage scale in District 18 (Alberta) between operators and district officials of the United Mine Workers were definitely broken off Saturday, March 15, the conferees being unable to come to an agreement. As the present agreement expires April 1, the possibility of a strike is uncomfortably close.

Consolidation in the Wind At St. Louis

A consolidation of the Southern Coal, Coke & Mining Co., with six Illinois mines, and the Donk Brothers Coal & Coke Co., with four, is the talk of the coal and financial circles of St. Louis, Mo., where both companies have headquarters. The deal has not been completed, however, and nobody knows yet whether it ever will be, logical though such a grouping would be in some particulars.

An important official of one of the companies said on March 14: "We cannot deny, of course, that a merger has been in contemplation. The details have not been finally concluded, however, and we must await such conclusion before we can give out anything concerning the subject."

It was reported that the Consolidated Coal Co. of St. Louis, headed by Kingdon Gould, of the Missouri Pacific Ry. interests, also was figuring in this consolidation, but W. J. Jenkins, vice-president and general manager, nailed this with a flat denial.

Most of the properties involved in the proposed consolidation are in the Standard district of Illinois immediately east of St. Louis, where few mines earned any money during the past year and where many companies are having hard sledding. Other consolidations and sales of mines are reported as taking form among such mining companies.

Pennsy to Take Over N. & W.; Three Want Virginian

A conference of committees representing the Norfolk & Western and the Pennsylvania railroads will be held soon to consider the leasing of the Norfolk & Western to the Pennsylvania, N. B. Maher, president of the Norfolk & Western, having announced that the first definite steps in the transaction had been taken by the Pennsylvania road.

"Following a special meeting of the directors of the Norfolk & Western," Mr. Maher said, "a communication was received from the president of the Pennsylvania R.R. suggesting the advisability of the lease of the Norfolk & Western by the Pennsylvania on terms which would preserve the operating identity of the Norfolk & Western.

"The Norfolk & Western was authorized to appoint a committee of the board to confer with a similar committee of the Pennsylvania R.R. board to see if such a lease could be negotiated and to report back to the board. If terms can then be agreed upon the matter would then be presented to the Interstate Commerce Commission."

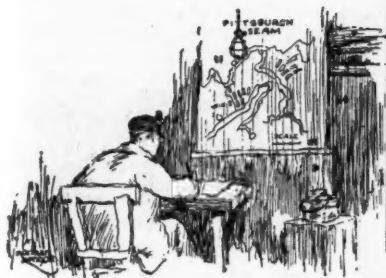
A report was circulated that the Pocahontas Coal & Coke Co. might be segregated from the Norfolk & Western R.R. before putting into effect the lease. It was stated also that a number of other operating changes would have to be made on the Norfolk & Western before leasing the property to the Pennsylvania.

The Baltimore & Ohio and the New York Central are bidding against each other for the lease of the Virginian Ry., each of the systems desiring to get control of the valuable coal fields on the line of the Virginian. The Chesapeake & Ohio R.R. also is anxious to obtain control of the Virginian, but it is said that the propositions from the New York Central and Baltimore & Ohio are more attractive to the heirs of the late H. H. Rogers, who founded the road.

As the leasing of the Norfolk & Western by the Pennsylvania is believed to be only a matter of days, the Baltimore & Ohio is eager to obtain the Virginian because it is feared that this road eventually may be taken over by the Pennsylvania. The Virginian is the Norfolk & Western's greatest competitor and has cut into the profits of that system by building great coaling piers on Hampton Roads. The Baltimore & Ohio almost closed a lease with the Virginian a year ago, but negotiations were broken off when a daughter of the late H. H. Rogers refused to relinquish her holdings.

Trade Commission Hampered By Lack of Funds

Lack of funds and personnel has hampered the work of the Federal Trade Commission according to report to the U. S. Senate March 11 in which the commission announced that it will not be able to carry on its work unless relief is extended. The work of the commission in conducting its numerous investigations into unfair trade practices is six months in arrears, the report stated.



Problems In Underground Management



Lining a Shaft With Precast Concrete

Shaft Relined from Bottom Up—However, Cross-Buntions or Side Slabs Embedded in Rock Will Support Weight When Lining Is Being Extended Downward

BY A. B. DOWELL
St. Louis, Mo.

In the retimbering of a shaft for the Cameron Coal Co., near Pittsburg, Ill., precast reinforced concrete slabs were used in place of timbers to form the curbing or lining of the shaft.

The shaft thus retimbered was 258 ft. deep and measured 10 x 18 ft. in the clear. In Fig. 1 is shown a view of the headframe and engine house adjoining, taken during the progress of the work. For certain reasons the relining of the shaft was started from the bottom, and a few of the slabs are seen in the foreground ready to be lowered into the shaft.

When this plan is adopted, a good foundation is sought for the first slab placed in position. Only such of the old timbers were removed as was necessary to make room for the concrete slabs, which are built up one on top of another. As each set of slabs forming a course is placed in position, the space behind is well packed and rammed with sand or other loose material that will form a solid support for the strata.

CAN LINE UPWARD OR DOWNWARD

The relining of a shaft may be commenced at the top and proceed downward, although there is some advantage in starting the work at the bottom and building up. This order of

procedure affords a better opportunity for packing the loose material behind the slabs as they are placed in position. In the sinking of a new shaft, the work must naturally start at the top and be carried downward as the excavation proceeds. It is important then to furnish adequate support for the lining during the progress of the work. This is best accomplished by providing cross-buntions embedded at suitable intervals in the solid strata, or by extending the slabs so that they will rest in niches of similar character.

In Fig. 2 is shown a large number of concrete slabs that have been cast in the required shape ready to be taken to the shaft. In the left foreground can be seen a few courses of these slabs built up in the form in which they will stand when in position. It will be observed there are two hoisting compartments separated by an open partition that serves to strengthen the longer slabs in the face of the shaft and provides support for the cage guides. At the farther end is seen a smaller compartment, which forms the manway and in which the column pipes for the pumps and power cables can be installed.

These precast concrete slabs were manufactured under the Dowell patent. The concrete mixture was formed of

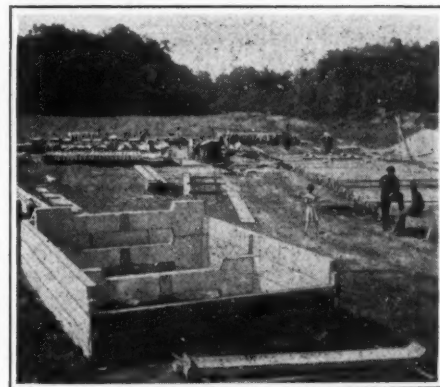


Fig. 2—Concrete Forms in Storage

From the structure in the foreground, laid up merely for exhibition purposes, an idea may be formed of the way in which the concrete units are arranged in the shaft.

the best quality of portland cement, one part; clean sharp sand, two parts; and selected gravel, three parts. Steel rods are used for reinforcing the slabs.

AS READILY HANDLED AS TIMBERS

After the concrete liners had been precast on the surface, they were handled much as timbers would be if used for the same purpose. The slabs form a tight skin-to-skin casing and when properly sealed, this lining affords an absolutely dry shaft, water being entirely excluded. In the instance mentioned, the shaft was very wet, but that did not materially interfere with the work of placing the slabs.

In order to obtain a watertight lining, proper care should be taken in sealing the joints. The construction or precasting of the concrete slabs is practically the same, in cost, as the framing of the necessary timbers; and the cost of handling and installing the slabs does not exceed that of handling the same quantity of timber curbing.

One of the chief advantages of the use of reinforced concrete slabs is the durability of the work when the installation has been properly performed. The natural hazards relating to shaft lining are reduced to a minimum and the construction provides a smooth surface that practically eliminates the danger of wrecks in the shaft caused by the catching of the cage in loose timbers.

By the use of the precast method the cost of building forms in the shaft is saved and the work of lining greatly simplified. The building trade after many attempts to cast concrete in place now uses it only where the work is heavy or the wall is readily braced exteriorly as for instance in lining a cellar or building a house foundation.

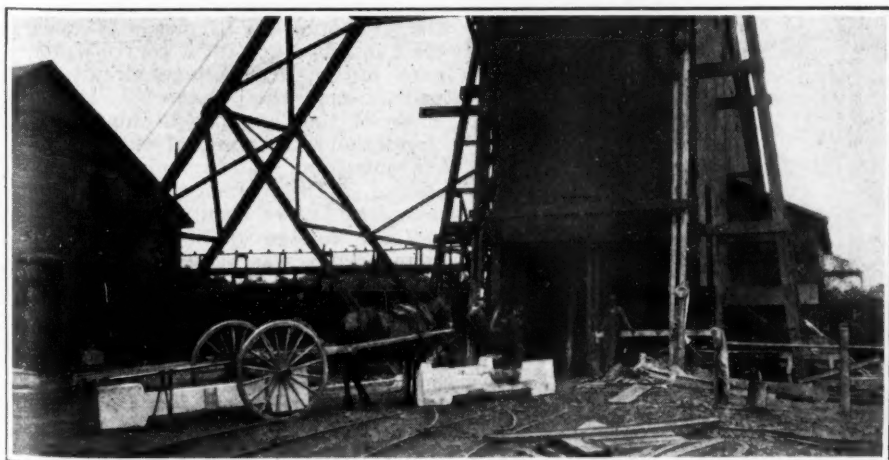
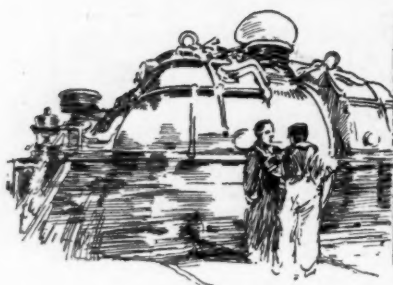
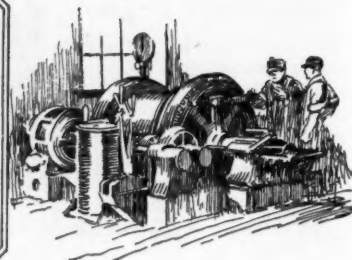


Fig. 1—Hauling Precast Units to Cameron Shaft Near Pittsburg, Ill.

The concrete units shown are buntions which stiffen shaft walls and sustain the cage guides. As the slabs and buntions are cast on the surface with all conditions favorable each unit is more nearly perfect as to reinforcement and freedom from voids than concrete not so constructed.



Practical Pointers For Electrical And Mechanical Men



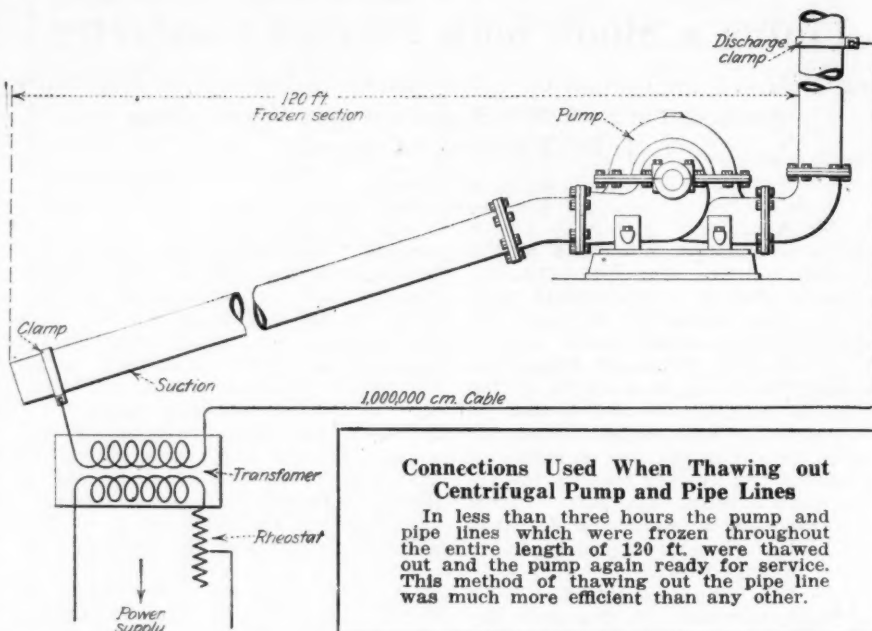
Thaw Frozen Water Pipes By Electricity

Temperatures in the mines are generally considered to be nearly constant throughout the whole year. However, every one who has ever been in a mine knows that there are certain places where the mine temperature is the same as that outside. This is especially true where the coal bed is not very deep, or where the ventilating air enters the mine.

The foot of a hoisting shaft is another such place, and because it is often located in the basin of the coal bed it is not infrequent to find that water can be easily collected there. Consequently pumps used to pump this water operate under conditions which are very similar to those outside and may become frozen.

Coal companies which own many of the houses located around the mine frequently find themselves very busy during the winter months in thawing out frozen water lines.

For just such conditions as these, our company designed and built a transformer to be used for thawing out frozen pipe lines. Incidentally, this same transformer has been very serviceable whenever we desired to make high current tests on equipment. The transformer was built in our own



Connections Used When Thawing out Centrifugal Pump and Pipe Lines

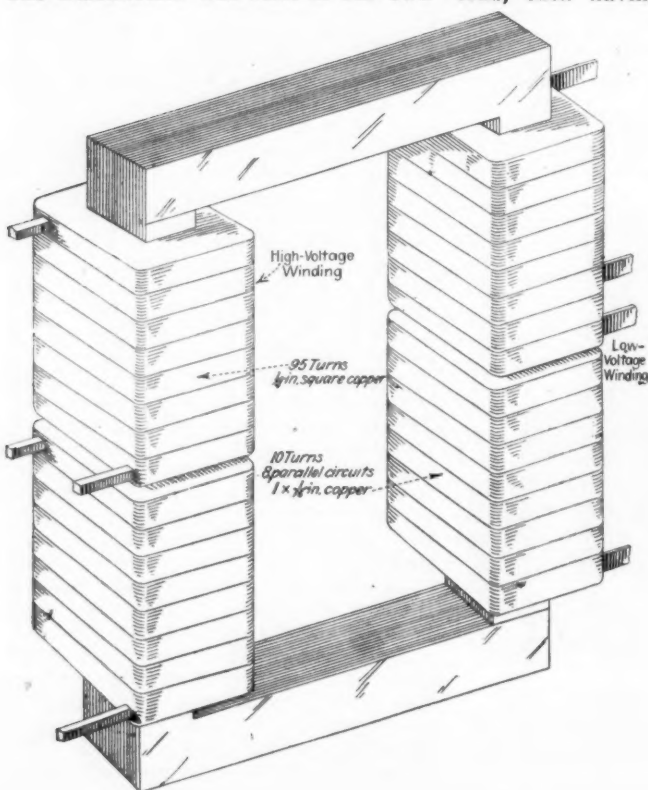
In less than three hours the pump and pipe lines which were frozen throughout the entire length of 120 ft. were thawed out and the pump again ready for service. This method of thawing out the pipe line was much more efficient than any other.

shops and is constructed with a core having a section 4 in. x 4 in. The long side of the core is 32 in. and the short side 12 in. The high-voltage winding is made up of two coils, each having 95 turns of $\frac{1}{4}$ in. square copper. The low-voltage winding is made up of two coils, each having eight parallel cir-

cuits of 10 turns of 1 in. x $\frac{1}{8}$ in. flat copper. The high-voltage winding was designed for either 110 or 220 volt, and the low-voltage winding designed to give about 1,000 amperes at 25 volts, or 2,000 amperes at 12.5 volts.

A few days ago, a 400-gal. centrifugal pump, located at the foot of one of our mine shafts became frozen. Upon investigation we found that the suction and discharge lines were also frozen for a distance of 120 ft. Our high-current transformer was placed on a truck and hauled to the mine where it was lowered in the shaft to the pump. Here it was set up and the secondary was connected to the suction and discharge line by means of 1,000,000 cm. cables. With a control resistance in the high-voltage circuit, the transformer was connected to one phase of the three-phase pump motor circuit, and the work of thawing out the pump and the 4-in. pipe line was started. The transformer was connected to deliver about 1,000 amperes, and the voltage applied to the high-voltage coils was regulated by means of a rheostat. Three hours from the time the transformer was connected to the power supply, both the pump and pipe lines were thawed out and again made ready for service. It can readily be seen that the cost of this work was very little compared with the cost of dismantling the pump and disconnecting pipe line, to say nothing about the possibility of breaking parts of the pump.

On many occasions, this same transformer has been used to thaw out



Transformer for High Currents

This transformer has two separate windings on both the high-voltage and low-voltage side. By proper connection it can be used on either 110- or 220-volt circuits, to deliver 1,000 or 2,000 amperes. Aside from being very useful in thawing out frozen pipe lines, it is frequently used for making high current tests. A transformer such as this can be used to thaw out frozen water lines around the mines and company houses and also to make high current tests on electrical equipment and circuits.

water service lines in some of the company's houses. With this transformer, our men have thawed out pipes in twenty different houses in less than five hours. To facilitate the work the transformer was hauled around on a truck and connected to a large lighting transformer.

F. F. MacWilliams,
Power Department.
Pennsylvania Coal & Coke Corp.,
Cresson, Pa.

Renewal of Fuses Made Safer
On Transformer Circuits

While replacing the blown-out fuses on a mine-lighting transformer a man was injured and our company accordingly was prompted to devise a standard method for mounting and fusing such transformers.

We had previously issued instructions covering the replacing of fuses and had also designed our structures to be as safe as they could be made within reason. However, in the words of one of our inspectors, we felt we were obliged to make this work "unreasonably safe." As a result a complete new code of instructions was drafted and a new standard mounting adopted

The accompanying illustration shows how the transformer is mounted and how the connections are made from the high-voltage circuit through choke coils, fuses, and transformer to the secondary distributing lines. The most important safety feature is the West-

Table of Fuse Wires for 2,300-Volt Lighting Transformers

Kva. Capacity	Maximum Primary Amperes	Size of Aluminum Fuse Wire	Size of Copper Fuse Wire	Size of Iron Fuse Wire	Lead Fuse (Amp. Capacity)
1.5	1.4	40	40	35	2
3	2.8	36	38	31	3
5	4.6	33	35	28	5
7.5	6.8	31	33	26	7
10	9.2	29	31	24	10
15	13.6	27	29	22	15
25	22.8	24	26	19	25

inghouse Type "OD" safety fuse box and its position on the pole. It will be noticed that this equipment is located on the opposite side of the pole from the transformer. This arrangement makes it necessary for the person renewing a fuse to climb the pole or set up a ladder on the side of the pole where he will be safe.

The fuse is enclosed in a box and arranged in such a manner that the opening of the box breaks the electrical circuit. The fuse clips which hold the fuse are on the inside of the door and the fuse is in contact with the line circuit only when the door of the fuse box is closed. With this arrangement, when the use is replaced, it is inserted between two "dead" clips instead of two "live" ones which is the usual practice.

This new plan is not expensive because the fuse box serves the double purpose of a switch and a fuse compartment. Men at the mines have accepted the plan with much favor and look upon the work of renewing a fuse with little or no fear because they know they are not required to place

themselves in danger of coming in contact with any "live" parts.

To make certain that these transformers are not fused unreasonably above their full capacity, each mine electrician and electrical worker is supplied with a copy of the accompanying table. This table shows what size aluminum, copper or iron wire should be used to fuse a transformer. The last column shows the ampere rating of the lead fuse wire which also may be used. In the calculation of the table it will be noticed that a liberal overload has been allowed.

O. E. Kenworthy.
Wilkes-Barre, Pa.

Composition of Insulation
For Mine Hangers

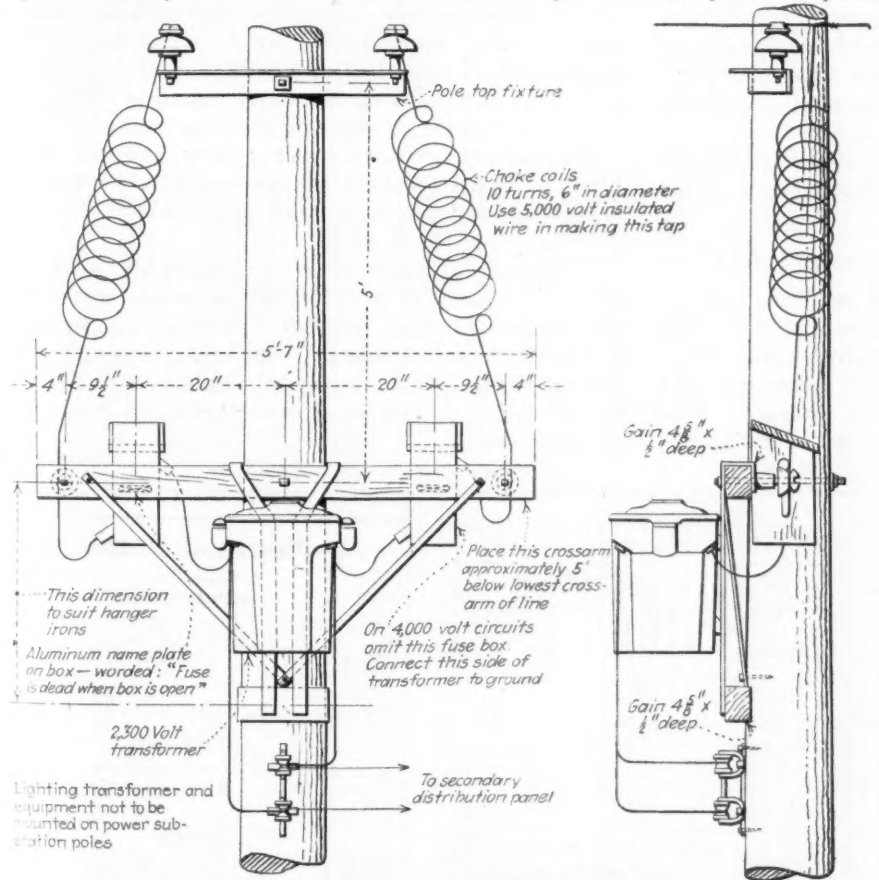
In answer to a request for information on the composition of the material used in mine suspensions, a large manufacturer of mine trolley equipment tells us the following:

The insulation used in the manufacture of mine hangers is a preparation whose constituents may be divided into three general classes: organic binders, inorganic binders and fillers.

The organic binders give the material its moldable properties, its moisture resistance, and its toughness, and are electrical insulators in themselves. Among these organic binders are phenol-formaldehyde compounds, shellacs, copals, and a number of other resins. In the manufacturing process these binders are very difficult to manipulate, and must be very carefully controlled, because they are extremely sensitive to heat.

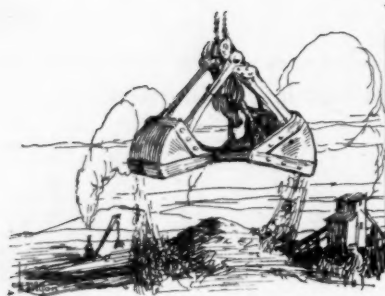
The inorganic binders are generally fibrous in their nature; chief among these is asbestos. Great care must be exercised in the selection of a fiber, for there are many grades varying markedly in mechanical strength. The principal property desired of the fiber is length and toughness. The fibers are intimately mixed with organic binders, thus preventing them from functioning as a wick. The tensile strength of the compound depends a great deal upon the grade of fiber.

Fillers are usually mica, talc, very short asbestos, kieselguhr, or barium sulphate. These materials are all heat insulators, giving the compound a very high heat resistance. Like the asbestos, they are also very resistant to all acids, thus rendering the material particularly good for service in mines where damp acid conditions are so often found which make the insulation problem a very difficult one. These materials must be carefully and thoroughly mixed and moulded so that an insulating substance of uniform quality may be produced.

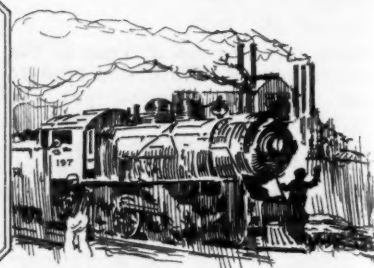


Lighting Transformer So Located on Transmission Line Pole
As to Be Safely and Easily Fused

The connections to the high-voltage wires are made through choke coils which protect the transformer from heavy surges or lightning disturbances. With the fuse boxes located on the opposite side of the pole from the transformer it is hardly possible for anyone to come in contact with the high-voltage wires or even with a ground connection.



Production And the Market



Flat Condition of Market for Bituminous Coal Causes Pronounced Tumble in Scale of Prices

Though the tendency of coal prices shows an even more marked downward course, consumers evince no disposition to recede from their recent policy of keeping out of the market and awaiting developments. In the absence of an impelling motive to buy, such as the menace of a nation-wide strike, buyers see no incentive to making commitments. The outcome of wage negotiations at Louisville, Baltimore and Philadelphia has been largely discounted by the agreement arrived at in Jacksonville last month.

The move of the Pennsylvania R.R. to lease the Norfolk & Western, followed quickly by efforts on the part of the New York Central, the Baltimore & Ohio and the Chesapeake & Ohio to gain control of the Virginian Ry., are fraught with interesting possibilities, not only on account of the immense coal traffic handled by the lines whose control is sought but because of the possible effect on the movement of West Virginia coal to New England. If the Pennsylvania and New York Central obtain control of the N. & W. and Virginian, developments in the movement of coal from the West Virginia field all rail as well as via Hampton Roads will be watched with more than ordinary interest.

Coal Age Index declined 2 points to 179, as of March 15, the corresponding average price being \$2.16. This compares with \$2.18 on March 8.

Midwest Price Cut Has Evanescent Effect

Price cuts in the Middle Western markets had an inspiring effect that was only fleeting, as they soon lapsed into a state of lackadaisical indifference. Scattered inquiries for contract coal have appeared, two railroads having placed half-million-ton contracts. The prevailing policy is to hold out, live off stockpiles and

wait for a lower market. Cold weather for a few days caused domestic business to perk up in southern Illinois and at St. Louis, but about half of the mines in the Williamson and Franklin County field are idle or will be by April 1.

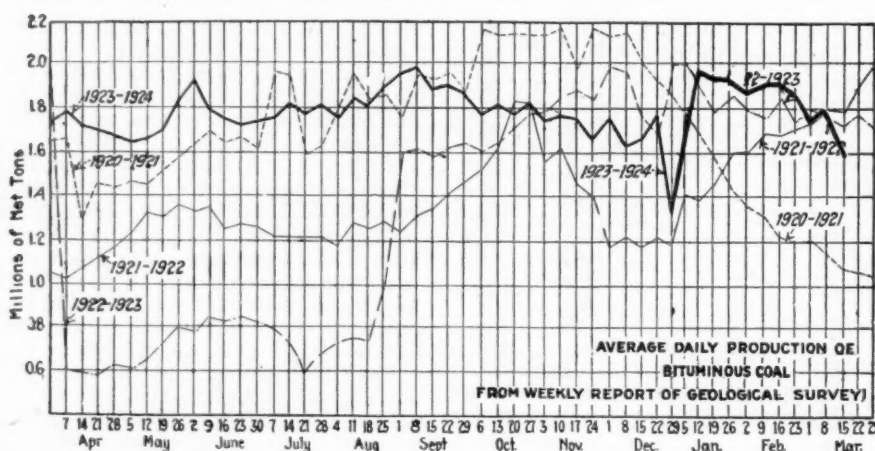
Kentucky Markets Scrambled

As a result of wage cuts in eastern Kentucky screenings are offered in quantities at 75c. per ton, which has demoralized the market. Prices are weak also on steam coals and small prepared sizes. A possible strike in western Kentucky has caused some large consumers of pea and slack to place inquiries. Opening of lake business provides a ray of hope for some, though the absence of national labor or rail troubles is likely to cause buying to be slow.

Northwestern markets are practically dead, buying being from hand to mouth—by utilities to tide them over a water shortage. Some of the docks are working only three or four days a week, something hitherto unheard of at this time of year. Softness is the prevailing note in Ohio markets, the record of interchange of cars at Cincinnati showing a clattering of the marts.

Dullness continues to pervade New England and the other seaboard markets as far south as Birmingham, consumers being well stocked and content to rely on their reserves for a while.

Production of bituminous coal during the week ended March 8 amounted to 9,596,000 net tons, according to the report of the Geological Survey, a decline of 1,104,000 tons compared with the previous week. Output of anthracite increased slightly, 1,882,000 tons being produced, compared with 1,866,000 tons in the previous week.



Estimates of Production

(Net Tons)

BITUMINOUS

	1922-1923	1923-1924
Feb. 23.....	10,324,000	10,367,000
March 1 (a).....	10,946,000	10,700,000
March 8 (b).....	10,628,000	9,596,000
Daily average.....	1,771,000	1,599,000
Coal year.....	396,316,000	513,058,000
Daily average coal year	1,374,000	1,788,000

ANTHRACITE

Feb. 23.....	1,838,000	1,655,000
March 1 (a).....	2,104,000	1,866,000
March 8 (b).....	2,049,000	1,882,000
Coal year.....	50,295,000	87,373,000

COKE

March 1.....	402,000	319,000
March 8.....	366,000	326,000
Calendar year.....	3,476,000	2,743,000

(a) Revised from last report. (b) Subject to revision.

Midwest Cuts Prices

The flat market on all coals compelled a change March 13 in the southern Illinois scale of prices. Franklin County association operators dropped lump and egg from \$3.75 and \$3.50 to \$3; No. 1 nut to \$2.75, and No. 2 to \$2.50. Saline County producers, next door to Franklin County, said they would try to maintain the same circular, though they normally are 25c. under it. At the end of the week this cut had shown only a little inspiring effect on the market. Nothing seems to wake it. Spring weather is here after a little business during several late snows, and domestic coals are all bought in smallest quantities.

A few inquiries for contract coal are circulating the trade at Chicago from scattering railroads and industries of various sorts, but they are not numerous. The general policy still is to hold out, live on storage piles and wait for a lower market. At least two half-million ton railroad contracts in the Midwest have been signed for southern Illinois at \$2.50, however.

Steam business is by no means keen, even though production in Illinois and Indiana keeps dropping and the volume of screenings gets smaller and smaller. Southern Illinois producers are making a stout effort to push the

price of screenings to \$2.25, but about \$2.10 is the top thus far, with most of the trading at \$1.90@\$. Indiana Fourth Vein screenings are at the same level. Central Illinois, with practically no volume but with a short haul to Chicago's great steam market, runs along at \$1.75@\$. \$1.80.

Cold weather for a few days in Southern Illinois stimulated activity in domestic sizes, principally lump, although egg and nut are heavy. Practically all mines have unbilled coal on track. Steam shows a little activity, but it is not progressing as might be expected, although with warmer weather there is every indication that it will advance. Railroad tonnage is reported light. Cars are plentiful and are moving well and mines are getting from two to four days a week, as a rule. Several mines have been idle and some have suspended indefinitely. It is estimated that one-half of the mines in the Williamson and Franklin County field are idle or will be by April 1—indefinitely.

St. Louis Does Some Business

Cool weather caused some domestic activity and dealers are pretty well loaded up with small orders on the cheaper grades. High grade is not popular and anthracite and smokeless are moving slowly, but coke shows up somewhat

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern					Midwest				
Market	Quoted	Mar. 19 1923	Mar. 3 1924	Mar. 10 1924	Mar. 17 1924†	Market	Quoted	Mar. 19 1923	Mar. 3 1924
Smokeless lump.....	Columbus.....	\$7.00	\$4.10	\$3.85	\$3.75@ \$4.00	Franklin, Ill. lump.....	Chicago.....	\$3.85	\$3.35
Smokeless mine run.....	Columbus.....	4.50	2.10	2.10	2.00@ 2.25	Franklin, Ill. mine run.....	Chicago.....	3.35	2.35
Smokeless screenings.....	Columbus.....	4.25	1.55	1.55	1.45@ 1.70	Franklin, Ill. screenings.....	Chicago.....	2.35	1.95
Smokeless lump.....	Chicago.....	6.35	3.60	3.60	3.50@ 3.75	Central, Ill. lump.....	Chicago.....	3.10	2.85
Smokeless mine run.....	Chicago.....	4.00	2.35	2.20	2.15@ 2.25	Central, Ill. mine run.....	Chicago.....	2.60	2.10
Smokeless lump.....	Cincinnati.....	7.00	3.50	3.35	3.00@ 3.60	Central, Ill. screenings.....	Chicago.....	1.60	1.70
Smokeless mine run.....	Cincinnati.....	4.85	2.50	2.40	2.00@ 2.60	Ind. 4th Vein lump.....	Chicago.....	3.60	2.85
Smokeless screenings.....	Cincinnati.....	4.75	1.75	1.60	1.50@ 2.00	Ind. 4th Vein mine run.....	Chicago.....	2.85	2.35
Smokeless mine run.....	Boston.....	7.10	4.70	4.70	4.60@ 4.75	Ind. 4th Vein screenings.....	Chicago.....	2.10	1.85
Clearfield mine run.....	Boston.....	3.05	1.95	2.00	1.65@ 2.60	Ind. 5th Vein lump.....	Chicago.....	3.10	2.60
Cambria mine run.....	Boston.....	3.85	2.60	2.60	2.25@ 3.00	Ind. 5th Vein mine run.....	Chicago.....	2.10	2.10
Somerset mine run.....	Boston.....	3.35	2.25	2.20	2.00@ 2.75	Ind. 5th Vein screenings.....	Chicago.....	1.60	1.60
Pool 1 (Navy Standard).....	New York.....	4.35	3.00	3.00	2.75@ 3.25	Mt. Olive lump.....	St. Louis.....	3.10	2.85
Pool 1 (Navy Standard).....	Philadelphia.....	4.55	3.00	3.00	2.75@ 3.25	Mt. Olive mine run.....	St. Louis.....	2.50	2.50
Pool 1 (Navy Standard).....	Baltimore.....	3.60	2.25	2.25	2.00@ 2.40	Mt. Olive screenings.....	St. Louis.....	1.35	1.55
Pool 9 (Super. Low Vol.).....	New York.....	3.80	2.30	2.30	2.10@ 2.50	Standard lump.....	St. Louis.....	3.10	2.75
Pool 9 (Super. Low Vol.).....	Philadelphia.....	3.50	2.05	2.05	2.15@ 2.60	Standard mine run.....	St. Louis.....	2.25	1.95
Pool 9 (Super. Low Vol.).....	Baltimore.....	3.10	2.00	2.00	1.75@ 2.15	Standard screenings.....	St. Louis.....	1.25	1.15
Pool 10 (H.Gr. Low Vol.).....	New York.....	3.15	1.85	1.85	1.70@ 2.00	West Ky. lump.....	Louisville.....	2.80	2.85
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	3.25	1.80	1.80	1.85@ 2.00	West Ky. mine run.....	Louisville.....	1.85	1.70
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	2.55	1.60	1.60	1.85@ 2.00	West Ky. screenings.....	Louisville.....	1.65	1.30
Pool 11 (Low Vol.).....	New York.....	2.55	1.60	1.60	1.85@ 2.00	West Ky. lump.....	Chicago.....	2.85	2.60
Pool 11 (Low Vol.).....	Philadelphia.....	2.55	1.65	1.65	1.85@ 2.00	West Ky. mine run.....	Chicago.....	1.80	1.60
Pool 11 (Low Vol.).....	Baltimore.....	2.35	1.65	1.65	1.70@ 1.80				

High-Volatile, Eastern					South and Southwest				
Market	Quoted	Mar. 19 1923	Mar. 3 1924	Mar. 10 1924	Mar. 17 1924†	Market	Quoted	Mar. 19 1923	Mar. 3 1924
Pool 54-64 (Gas and St.).....	New York.....	2.35	1.60	1.60	1.40@ 1.65	Big Seam lump.....	Birmingham.....	3.85	3.85
Pool 54-64 (Gas and St.).....	Philadelphia.....	2.25	1.60	1.60	1.50@ 1.75	Big Seam mine run.....	Birmingham.....	1.80	1.80
Pool 54-64 (Gas and St.).....	Baltimore.....	2.40	1.60	1.60	1.70@ 2.00	Big Seam (washed).....	Birmingham.....	2.10	2.10
Pittsburgh sc'd gas.....	Pittsburgh.....	4.05	2.55	2.55	2.50@ 2.65	S. E. Ky. lump.....	Chicago.....	4.60	3.10
Pittsburgh gas mine run.....	Pittsburgh.....	2.35	2.10	2.10	2.00@ 2.25	S. E. Ky. mine run.....	Chicago.....	2.85	1.85
Pittsburgh mine run (St.).....	Pittsburgh.....	2.60	1.50	1.35	1.40@ 1.50	S. E. Ky. lump.....	Louisville.....	5.05	3.25
Pittsburgh slack (Gas).....	Pittsburgh.....	4.25	2.60	2.60	2.40@ 2.70	S. E. Ky. mine run.....	Louisville.....	2.75	1.75
Kanawha lump.....	Columbus.....	2.60	1.60	1.50	1.40@ 1.65	S. E. Ky. screenings.....	Louisville.....	2.50	1.30
Kanawha mine run.....	Columbus.....	2.05	1.10	1.05	1.00@ 1.10	S. E. Ky. lump.....	Cincinnati.....	3.60	3.00
Kanawha screenings.....	Columbus.....	3.75	2.85	2.85	2.75@ 3.00	S. E. Ky. mine run.....	Cincinnati.....	2.75	1.60
W. Va. lump.....	Cincinnati.....	3.35	1.55	1.50	1.35@ 1.60	S. E. Ky. screenings.....	Cincinnati.....	2.35	1.00
W. Va. gas mine run.....	Cincinnati.....	3.00	1.55	1.50	1.35@ 1.60	Kansas lump.....	Kansas City.....	4.50	5.00
W. Va. steam mine run.....	Cincinnati.....	2.35	1.05	.90	.75@ 1.00	Kansas mine run.....	Kansas City.....	3.50	3.50
W. Va. screenings.....	Cincinnati.....	3.75	2.60	2.60	2.40@ 2.70	Kansas screenings.....	Kansas City.....	2.60	2.25
Hoeking lump.....	Columbus.....	2.35	1.85	1.85	1.75@ 2.00				
Hoeking mine run.....	Columbus.....	1.95	1.10	1.15	1.00@ 1.10				
Hoeking screenings.....	Columbus.....	3.70	2.35	2.35	1.90@ 2.75				
Pitts. No. 8 lump.....	Cleveland.....	2.70	1.80	1.80	1.75@ 1.90				
Pitts. No. 8 mine run.....	Cleveland.....	2.50	1.35	1.30	1.25@ 1.35				

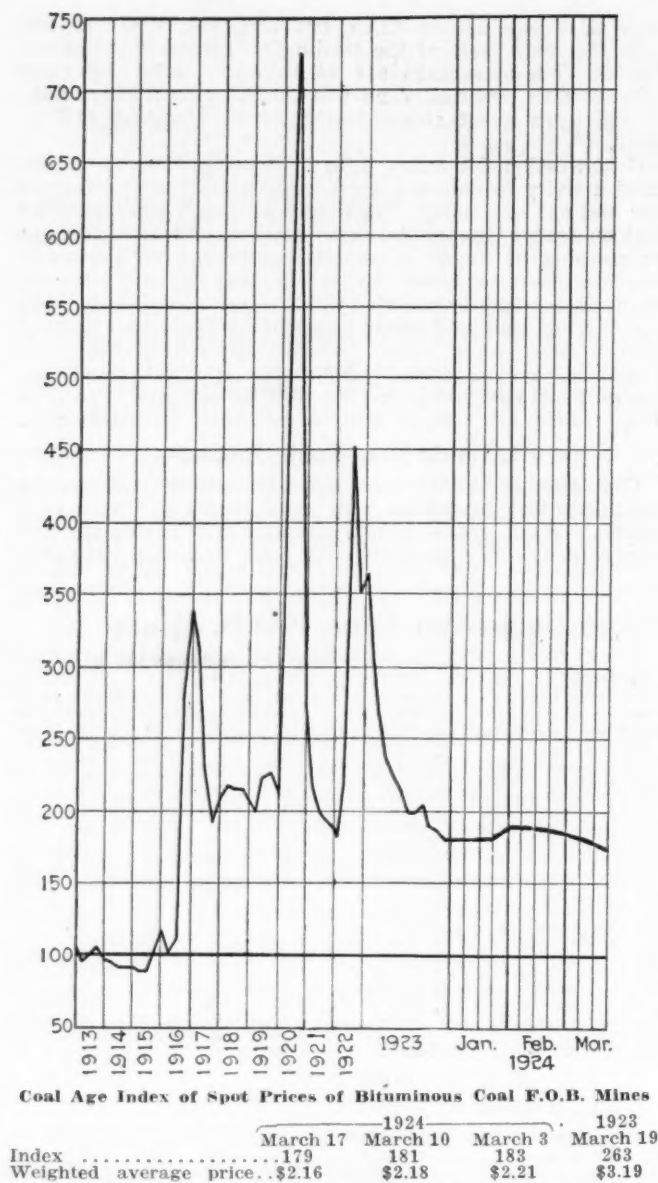
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market		Freight Rates		March 19, 1923		March 10, 1924		March 17, 1924†	
Quoted		Independent		Company		Independent		Company	
Broken.....	New York.....	\$2.34	\$9.00	\$7.75@ \$8.25		\$8.00@ \$8.50	\$8.75@ 9.25	\$7.75@ \$8.25	\$8.75@ 9.25
Broken.....	Philadelphia.....	2.39		7.90@ 8.10		8.75@ 9.25	8.75@ 9.25	8.50@ 10.00	8.75@ 9.25
Egg.....	New York.....	2.34	9.25@ 11.00	8.00@ 8.35		8.50@ 10.00	8.75@ 9.25	7.50@ 8.80	8.00@ 8.35
Egg.....	Philadelphia.....	2.39	9.25@ 11.00	8.10@ 8.35		9.25@ 9.75	8.75@ 9.25	9.25@ 9.75	8.75@ 9.25
Egg.....	Chicago.....	5.06	12.00@ 12.50	7.20@ 8.25		8.00@ 8.35	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Stove.....	New York.....	2.34	9.25@ 11.00	8.00@ 8.35		9.25@ 9.75	8.75@ 9.25	9.25@ 9.75	8.75@ 9.25
Stove.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35		9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Stove.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.25		7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Chestnut.....	New York.....	2.34	9.25@ 11.00	8.00@ 8.35		9.25@ 9.75	8.75@ 9.25	9.25@ 9.75	8.75@ 9.25
Chestnut.....	Philadelphia.....	2.39	9.25@ 11.00	8.15@ 8.35		9.85@ 11.00	8.90@ 9.25	9.85@ 11.00	8.90@ 9.25
Chestnut.....	Chicago.....	5.06	12.00@ 12.50	7.35@ 8.35		7.95@ 9.25	8.00@ 8.35	7.95@ 9.25	8.00@ 8.35
Range.....	New York.....	2.34		8.25			9.00		9.00
Pea.....	New York.....	2.22	6.30@ 9.00	6.15@ 6.30		4.50@ 5.50	6.15@ 6.65	4.75@ 5.25	6.15@ 6.65
Pea.....	Philadelphia.....	2.14	7.00@ 9.00	6.15@ 6.20		4.75@ 6.50	6.35@ 6.60	4.75@ 6.50	6.35@ 6.60
Pea.....	Chicago.....	4.79	7.00@ 8.00	5.49@ 6.03		4.50@ 5.60	5.40@ 6.05	4.50@ 5.60	5.40@ 6.05
Buckwheat No. 1.....	New York.....	2.22	3.75@ 4.25	4.00@ 4.10		2.00@ 2.75	3.50	2.25@ 3.00	3.50
Buckwheat No. 1.....	Philadelphia.....	2.14	4.00@ 5.00	4.00		2.25@ 3.50	3.50	2.25@ 3.00	3.50
Rice.....	New York.....	2.22	2.25@ 3.00	2.75@ 3.00		1.75@ 2.25	2.50	1.75@ 2.25	2.50
Rice.....	Philadelphia.....	2.14	2.75@ 3.00	2.75@ 3.00		1.75@ 2.50	2.50	1.75@ 2.25	2.50
Barley.....	New York.....	2.22	1.40@ 2.00	1.50@ 2.00		1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley.....	Philadelphia.....	2.14	1.40@ 2.00	2.00		1.25@ 1.50	1.50	1.25@ 1.50	1.50
Birdseye.....	New York.....	2.22		2.10		1.60	1.60	1.60@ 1.75	1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

better. Local steam is fairly active in carloads but wagon trade is beginning to ease up. Country domestic has shown considerable activity the past week, for cheaper grades principally. A little inquiry is made for anthracite chestnut. Country steam is not good. There is no change in retail prices.

Kentucky Prices Drop Too

Business over the past few days in Louisville has been unsatisfactory. Wage reduction in some parts of the eastern Kentucky field has resulted in screenings being offered in quantities at 75c. a ton, and mine run at \$1.15@\$1.35 a ton, which has demoralized the market. Prices are generally weaker on steam coals and small sizes of prepared, and it is asserted that there isn't much coal commanding over \$3 a ton at the most.

In view of the possibility of a strike in western Kentucky a few of the large consumers of pea and slack size screenings have been placing inquiries for supplies. Opening of lake business next month will aid the eastern Kentucky section, but without any pending national strikes or railroad troubles buying will be slow.

Lack of production of prepared sizes in western Kentucky is resulting in a firm market on screenings and rela-

tively light offerings. The present market is quoted at \$1.25@\$1.40, and is likely to go up unless some lump business is offered. Lump is \$2.75@\$3 and egg, \$2.50@\$2.75. Some mines have no screenings to sell and are only quoting screenings where the buyer will take prepared. Some operators are reported to be installing crushers, in order to crush mine run or nut and slack into pea and slack, to take care of the steam demand for fine coal. Western Kentucky is expected to go non-union after April 1, except possibly a region in Muhlenberg County where unionism is stronger.

Northwest Trade Is Flat

The coal market at Duluth is more than quiet. It is practically dead, with the exception of a few orders from the public-utility companies, which are buying often, from hand to mouth, because of the shortage of water flow for hydraulic plants. It begins to look as if the public-utility companies will be the savers of the day, as little snow is on the ground and their unusual wants may cause the docks to get rid of their surplus supplies. To illustrate the quietude, some of the docks are working only three or four days in the week. This is practically unheard of at this time of the year.

Prices went down and up during the week. The Superior Coal & Dock Co., which has discontinued because its parent concern in the East, the Maynard Coal Co., is in the hands of a receiver, lowered the price of Hocking 25c. to \$5.75, and other companies followed suit. This was done, of course, in an effort to clear stocks. The dock closed, however, and prices went back to list.

Shipments of the docks during February ran slightly higher than expectations, with 17,188 cars reported. This was principally railroad coal that was hauled to depots for use in case of a cold snap. In January 25,984 cars went out and in February last year 13,969 cars. Dock men expect poor shipments this month.

The demand for coke has fallen off, as also has that for hard coal. Mild weather is the cause. However, the briquet business has picked up some.

All is quiet in coal circles at Milwaukee pending the readjustment downward of soft-coal prices. Dockmen will have to follow Western coal down if they expect to reduce their unusually large spring surplus before new coal begins to arrive.

Kansas Prices Down 50 Cents

The price of Kansas lump and nut was cut 50c. a ton March 10. Present quotations are \$4.50 for lump and \$4 for nut. Mine run is quoted generally at \$3.25, although it still is listed by some operators at \$3.50. Screenings are \$2.50. The slash on lump and nut was due chiefly to the nearness of the end of the season. The accumulation of "no bills" of the two sizes was increasing, although operating time had been cut to three days a week. The reduction, coupled with a return of cold weather at the same time, has reduced the surplus, but the relief is expected to be of short duration.

The coal market in Colorado was fairly busy during the past week. Mines worked a little better than half time. Seasonable weather has again set in throughout the regions where this coal is marketed and with the recent extreme cut, business is expected to pick up.

Utah operators report business quiet. Mines are working less than two days a week. The demand for lump is falling off although retailers have been enjoying a little business during the past week as result of a cold snap. Industrials and larger consumers continue to clamor for slack. Prices are unchanged and labor conditions are settled.

Ohio Markets Soft from Oversupply

J. A. Morris, district manager for the American Railway Association at Cincinnati reports that 12,453 cars of coal interchanged at Cincinnati last week, an increase of 223 over the previous week and an increase of 2,411 compared with same week last year. This is the heaviest interchange of coal on record in this terminal, except for one week in the month of June, 1922, when 13,825 cars of coal were interchanged, but this included 2,410 cars of coal en route to the lakes. No better means of explaining the softness and shallowness of conditions here could be found.

There is practically no demand for any particular kind of coal. From the low volatile to the lowliest of any "black

dirt" offerings neither price nor energy seems to move sales. There are still a large number of rejections and those operators who have been turning out tonnage persist in cluttering the immediate markets by shooting their free tonnage on consignment.

Dullness characterizes the Columbus market. Domestic business is exceedingly spotty and little activity from that source is now expected, as this trade is now purely a weather proposition and dealers are loath to increase stocks. The fancy grades, such as Pocahontas and other smokeless grades are selling fairly well, although prices are showing some softness. Steam trade is almost at a standstill, as the larger consumers are using reserves accumulated prior to the wage settlement. They are gradually working to a normal basis. There has been considerable distress coal in steam sizes and these were sacrificed at rather low prices. Utilities are not buying to any extent and railroads are taking only their usual requirements. Screenings have been rather dull, as stocks have been heavy and prices in some instances went very low. Production in all Ohio fields has fallen to about 20 per cent of capacity as a result of the falling off in demand. Some stir is shown in the lake trade, one large Ohio producer having started to load boats in the Toledo harbor.

Hesitancy continues to dominate the Cleveland coal market. Consumers are not purchasing, but are awaiting further depletion of coal put in prior to mid-February, when all apprehension was removed in so far as mining cessation was concerned. Despite the dull market, spot prices are holding firm at recent levels, with the slight exception of 3-in. lump, some sales of which are reported at \$1.90 as compared with a previous low of \$2. Mining operations have slowed down, production in the eastern Ohio field during week ended March 8 being 324,000 tons, the lowest of any full week's operations, excepting the holidays, in eleven months.

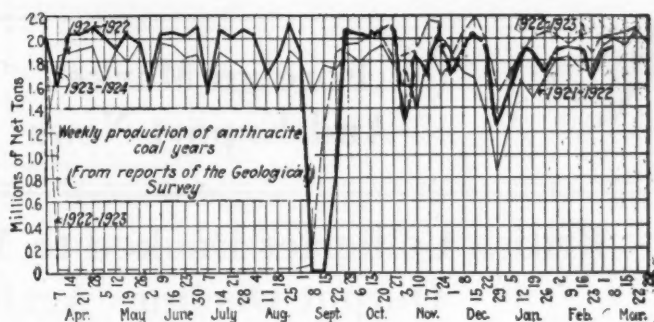
Production in the Pittsburgh district has been declining slightly. The full force of the competitive condition between the district and various non-union districts will not be felt until after April 1, when contracts expire. Nothing definite has developed as to contracts for the new coal year; there does not seem to have been enough actual negotiating to develop actual prices on contract. In the spot market prices are unchanged except that steam slack has continued to decline, being forced for sale on account of heavy shipments of domestic lump, while some consumers have stocks of slack they are liquidating.

No improvement is shown at Buffalo. Consumption is pretty good and so is the general business feeling, but output exceeds requirements.

New England Market Drags

In New England the market drags along with no bright spots anywhere. Even with the approach of April, buyers show almost no interest in prices, either spot or for season delivery. The few consumers who expect to be in the market later on are only keeping in touch with current quotations to measure the possible spring decline when conditions settle down for the long pull through the summer months.

At Hampton Roads there is no appreciable change. Navy standard grades of Pocahontas and New River are available in any quantity desired, and the spot price per gross ton f.o.b. vessel ranges from \$4.60 to \$4.75. Those agencies with strong Western connections continue to move a fair



proportion of their output in that direction at slightly better than \$4.75 at Hampton Roads. Others, however, with less Western business are inclined to take from 10 to 15c. less in order to keep coal moving to the piers. At this end there is constant pressure to sell coal against arrivals, and for that reason \$5.90 per gross ton on cars, Boston, is about the highest figure obtainable from any except small users. At Providence and at Portland, due to better local conditions, the on-car basis is somewhat higher.

All-rail there is next to nothing doing. What tonnage is being placed is on small requirements, and the active shippers are busy combing over every possible prospect.

No Ardor in Seaboard Markets

Little enthusiasm is in evidence in the soft-coal market at New York. The general market is quiet, only the better grades and some individual coals moving easily. Some contracts have been renewed at 25c. to 50c. above present spot prices, but many consumers who in former years have had contracts are going to take chances with the open market. Demand in the spot market is slow and prices show comparatively no change. Many consumers have from sixty to ninety days' reserves on hand.

The consumer is sitting pretty in the Philadelphia market, everything seeming to be in his favor. He now knows that he can get coal whenever he wants it, and he is coming close to the point where he does not want much. Prices hold firm. The producers seem to have said "this is bottom" so long now, that it actually seems to be true, and no sign of slackening demand, which occasionally crops up, has any adverse effect on spot prices.

The Baltimore trade is encouraged by a stronger line of inquiry both for spot and contract business after April 1, and price quotations, while still weak, are the best for some time past. The fact that little or no trouble is anticipated from labor sources in the mining regions is probably the only thing that has checked a sharp advance of the market.

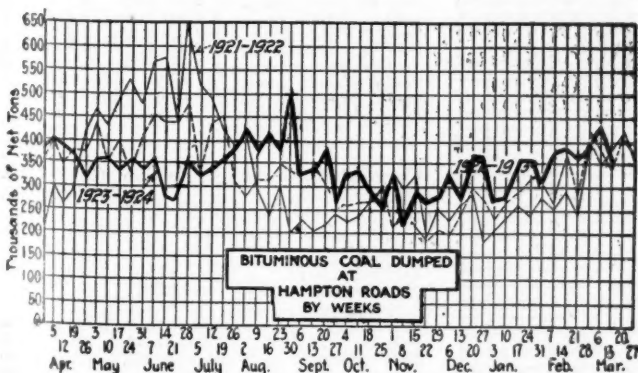
Anthracite Moving Only for Actual Needs

Activity in the anthracite domestic coal market at New York is limited to the actual needs of consumers. It is however, sufficient to take care of shipments to this tidewater. There have been some offerings at tidewater of loaded boats of the larger sizes which have been let go at slightly less than current spot prices, but such sales have been few. Egg coal is slowly gaining in strength, demand is better and more is being sold at the average price than at a low figure. Stove and chestnut continue in good demand, while pea coal is moving slowly. Barley and birdseye are in good call. Buckwheat and rice are not active and can be had below company schedule. Normal March weather in Philadelphia has served to make some business for the retailer, but the consumer is buying as little coal as possible, being firmly convinced that he is going to get cheaper coal after April 1, and quite a few dealers hold a like opinion.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Weed ended March 1, 1924.....	945,049	186,470
Previous week.....	845,898	175,834
Same week in 1923.....	918,624	193,548

	Surplus Cars		Car Shortage	
	All Cars	Coal Cars		
Feb. 22, 1924.....	134,273	56,618	3,991	2,475
Previous week.....	125,177	48,252	5,944	
Same date in 1923.....	15,819	4,845	80,633	38,771



Foreign Market And Export News

British Collieries Booked to Mid-April; Output Declines Again

The Welsh coal market is unsettled as an aftermath of the dock strike. While stocks lasted the market was unaffected, but the subsequent disorganization is very evident. Dealers report difficulty in effecting arrangements for new business because all collieries are heavily booked with orders to the middle of April. Dealers are much in arrears with their deliveries and find it impossible to overtake orders with the two-shift working system.

The domestic demands continue very large and foreign buyers are reported to be placing substantial orders in the United States owing to their inability to obtain requirements in the British market even at enhanced prices. Foreign buyers in some cases are accumulating stocks against an expected strike of miners. The anthracite market is firm and steady, and all the best grades are well booked. Demand from France and Italy is good.

Output of British collieries during the week ended March 1, a cable dispatch to *Coal Age* states, was 5,702,000 tons, according to the official reports. This compares with 5,802,000 tons in the week ended Feb. 23.

In the Newcastle market prices have slightly appreciated and show a tendency to harden. Most of the collieries are well sold for several weeks. Inquiry from Germany shows a tendency to fall off.

Hampton Roads Discerns Brighter Outlook

Business is dull on spot at Hampton Roads but movement is fairly heavy on contracts, particularly to South American ports. Prices are dropping, which is attributed by shippers to the fact that no untoward incidents impend in the coal trade to disrupt the market.

Coastwise business is fairly good, as is the bunker trade, but dumpings have fallen off somewhat. Several inquiries

which may lead to big contracts later are reported by shippers, but as a whole the tone of the market is dull. The outlook is reported by shippers as brighter, however, with the expectation that April 1, the annual contract period, will see buyers coming into the market substantially.

French Coal in Brisk Demand; Domestic Consumption Heavy

Demand for French fuels continues to be the feature of the coal market in France, consumers desiring to avoid the high prices prevailing for British coal. Consumption of domestic fuel is heavy, due to the continued cold weather.

Price reduction is not being uniformly applied, certain mines in the Loire basin with difficult workings having lowered their prices by 1, 2 and 3 fr., according to grade. As there was no increase last January in the Lorraine and Sarre coal fields, prices there are unchanged, but a reduction is expected soon in the latter field. These price changes come at a time when miners are about to ask again for higher wages, due to the increased cost of living.

Shipments of Sarre coal to France could reach an average of 50,000 to 60,000 tons a day but for a scarcity of trucks. Imports of British coal have fallen off considerably. The strikes in Great Britain had no direct influence on the French market, as the demand for imported house coals has been lower.

Deliveries of indemnity fuels continue at about the rate for the last two months. During February the French metallurgical industry received a daily average of nearly 11,000 tons of coke. The government has informed the Office des Houillères Sinistrées that the price for German coke will be maintained at 143.50 fr. (delivered at the frontier) for March.

Nearly 18,500,000 fr. was collected

on the coal tax in the Ruhr during the last ten days in February, 6,000,000 fr. of this covering arrears in taxes. The output of several of the most important mines in the area, belonging to the Thyssen, Stinnes, Krupp and other groups, now is in excess of the 1922 output by from 10 to 27 per cent.

Export Clearances, Week Ended March 15, 1924

FROM BALTIMORE

For Argentina	Tons
Br. Str. Lady Charlotte.....	5,782
For France	
Fr. Str. Lieut. Jean Laurent.....	8,101

FROM HAMPTON ROADS

For Argentina	Tons
Br. Str. Clearpool, for Puerto La Plata.....	5,323
Fr. Str. Louis L. D., for Buenos Aires.....	5,817
Ital. Str. Volturro, for Buenos Aires.....	7,180
Br. Str. Ethelwolf, for Buenos Aires.....	5,975
For Brazil	
Braz. Str. Taubate, for Rio de Janeiro.....	6,334
Ital. Str. Monte Nero, for Porto Ferrajo.....	6,835
Amer. Str. Robin Hood, for Rio de Janeiro.....	8,690
Br. Str. Davenby Hall, for Rio de Janeiro.....	5,718
For Bermuda	
Amer. Schr. James M. W. Hall, for Hamilton.....	793
For Egypt	
Br. Str. City of Athens, for Port Said.....	2,980
For Uruguay	
Br. Str. Nilemede, for Montevideo.....	5,532
Br. Str. Domingo de Larrinaga, for Montevideo.....	5,005
For West Indies	
Swed. Str. Finn, for Port Castries.....	2,523
Br. Str. Pikepool, for Port de France.....	5,386

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	March 6	March 13
Cars on hand.....	1,403	2,212
Tons on hand.....	85,399	129,096
Tons dumped for week.....	185,418	155,098
Tonnage waiting.....	25,000	10,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,429	1,730
Tons on hand.....	96,950	117,450
Tons dumped for week.....	117,679	86,650
Tonnage waiting.....	9,562	10,000
C. & O. piers, Newport News:		
Cars on hand.....	1,469	1,920
Tons on hand.....	69,555	90,385
Tons dumped for week.....	88,361	69,383
Tonnage waiting.....	4,840	5,750

Pier and Bunker Prices, Gross Tons

	PIERS	March 8	March 15†
Pool 9, New York...	\$5.00@	\$5.25	\$4.75@ \$5.25
Pool 10, New York...	4.75@	5.00	4.60@ 5.00
Pool 11, New York...	4.50@	4.75	4.50@ 4.75
Pool 9, Philadelphia...	4.90@	5.20	4.90@ 5.20
Pool 10, Philadelphia...	4.50@	4.90	4.50@ 4.90
Pool 11, Philadelphia...	4.25@	4.60	4.25@ 4.60
Pool 1, Hamp. Roads...	4.75		4.65@ 4.75
Pools 5-6-7 Hamp. Rds.	4.15@	4.25	4.10@ 4.25
Pool 2, Hamp. Roads...	4.50		4.40@ 4.50
	BUNKERS		
Pool 9, New York...	5.30@	5.55	5.05@ 5.55
Pool 10, New York...	5.05@	5.30	4.90@ 5.30
Pool 11, New York...	4.80@	5.05	4.80@ 5.05
Pool 9, Philadelphia...	5.15@	5.55	5.15@ 5.55
Pool 10, Philadelphia...	4.90@	5.20	4.90@ 5.20
Pool 11, Philadelphia...	4.65@	5.10	4.65@ 5.10
Pool 1, Hamp. Roads...	4.75		4.75
Pool 2, Hamp. Roads...	4.50		4.50
Pools 5-6-7 Hamp. Rds.	4.25		4.20

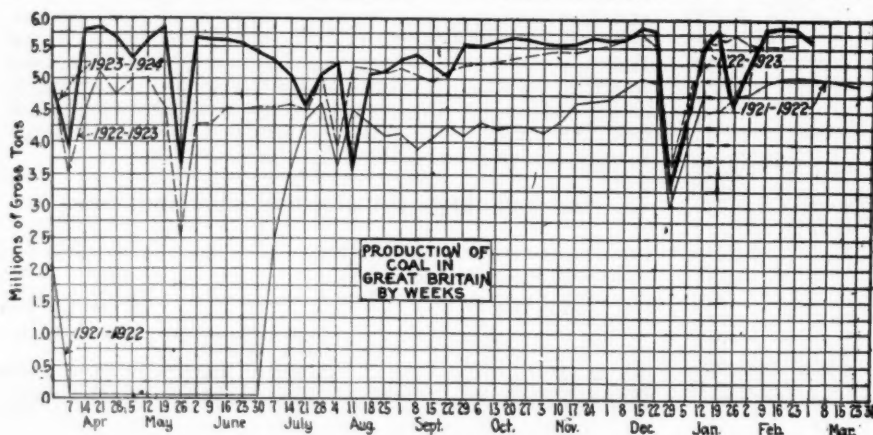
Current Quotations British Coal f.o.b.

Port, Gross Tons

Quotations by Cable to Coal Age

Cardiff:	March 8	March 15†
Admiralty, large.....	27s. @ 28s.	31s. @ 32s.
Steam smalls.....	18s. @ 20s.	23s.
Newcastle:		
Best steams.....	26s. 6d. @ 26s. 9d.	25s. 9d. @ 26s.
Best gas.....	25s. @ 25s. 3d.	25s. @ 25s. 3d.
Best bunkers.....	24s. 6d. @ 25s.	23s. @ 23s. 6d.

† Advances over previous week shown in heavy type, declines in italics.



Traffic News

Supreme Court Advances Appeal In Car-Distribution Case

Motion to advance the appeal of the federal government from the decision of the Southern West Virginia District Court in favor of the New River Co. and various other coal mining companies setting aside the Interstate Commerce Commission order regarding car distribution to mines served by more than one carrier was granted by the U. S. Supreme Court March 17 and the case was set for argument April 21.

In its order the Interstate Commerce Commission on Dec. 11, 1922, directed that mines served by more than one carrier should file copies of car requisitions with the agent of each carrier and that the combined requisitions must not exceed the gross daily rating of the mines. The district court, with three judges presiding, voted two to one, granting a permanent injunction to the mine companies and setting up a system of coal-car distribution which differs from that laid down by the Interstate Commerce Commission. The government appealed, and filed a motion to expedite the case, which motion has been granted.

Propose Advance in Coke Rates

The Coal, Coke & Iron Ore Committee, Central Freight Association Territory, announces a hearing in Room 606, Chamber of Commerce Building, Pittsburgh, Pa., Thursday, March 27, 1924, at 10:00 a.m., on the following proposed changes in rates on coke (except petroleum, creosote and tar or pitch coke), coke breeze, coke dust and coke screenings, carloads, from ovens on Louisville & Nashville and Interstate Roads in Virginia, Kentucky and Tennessee, and from ovens on the C. N. O. & T. P. Ry. (Southern Ry.), to Cincinnati, Ohio, Latonia, Covington and Newport, Ky., rate to be advanced from \$2.59 per net ton to \$2.90 per net ton; to Louisville, Ky.; Jeffersonville and New Albany, Ind., rate to be advanced from \$2.37 per net ton to \$2.65 per net ton. These proposed advances are intended to restore parity of rates with those from C. & O., N. & W. and Connellsville (Pa.) districts which was disturbed by the decision in ICC-Ex Parte 74.

Hearing on Rate Advance

The Coal, Coke & Iron Ore Committee, Central Freight Association Territory, announces that a hearing will be held in Room 606, Chamber of Commerce Building, Pittsburgh, Pa., Thursday, March 27, 1924, at 10 a.m., on the following proposed changes in rates on bituminous coal, carloads: From mines on B. & O. R.R. in No. 8 (Ohio) District to Peoria, Ohio, via New York Central R.R. (Ohio Central Lines); from mines on B. & O., D. T. & I., N. & W. and Hocking Valley roads, in Jackson County (Ohio) District to Peoria, via

New York Central R.R. (Ohio Central Lines), and from mines on Hocking Valley road to Raymonds, Lunda and West Mansfield, Ohio, via New York Central R.R. (Ohio Central Lines); rates to be advanced 6c. per ton, to \$1.89, to remove long- and short-haul clause departures. Rates from Clarion, Dundas, Elfork, Hawks, Minerton, McArthur, Oretton, Orland, Radcliff and Vinton, Ohio, on the Hocking Valley Ry., to Peoria, Raymonds, Lunda and West Mansfield, Ohio, to remain as at present, i.e., \$1.64 per net ton.

C. & O. Breaks Loading Record

The Chesapeake & Ohio established a new high record for coal loading in February, 18,011 carloads being moved in the week ended March 1. The previous high record was 17,742 cars, loaded during the week ending Sept. 1, 1923. Although February was a short month, loadings for the month totaled 68,551 cars.

Association Activities

The the annual meeting of the Upper Potomac Coal Association, held in Cumberland, the following officers were elected: President, T. M. Dodson of Bethlehem, Pa. (re-elected); Vice-President, R. Marsh Dean, of Elk Garden, W. Va., to succeed J. A. Brown of Frostburg, Md.; Treasurer, R. A. Smith, of Blaine, W. Va. (re-elected); Secretary, J. F. Palmer, of Cumberland, Md. (re-elected). Three new directors were chosen to serve on the board for the ensuing three years. They are Douglas Gorman, of Baltimore, Md.; S. D. Brady, of Fairmont, W. Va. and J. G. Emmons, of Philadelphia, Pa. The board of directors held its meeting prior to that of the membership as a whole and reviewed the year's activities and transacted routine business. The meeting of the association proper was held in the ball room of the Fort Cumberland Hotel, the tonnage of the Upper Potomac, western Maryland and western Pennsylvania fields being well represented. The principal speaker at the meeting was Harry L. Gandy, executive secretary of the National Coal Association. Mr. Gandy addressed himself to the legislation situation at Washington and discussed the benefits of association activities and co-operation between coal operators. Following his address members were given an opportunity to discuss questions of interest to the industry.

The Fayette-Greene Coal Producers Association held an important meeting at the Uniontown Country Club March 10, when forty-five coal and coke operators with interests in the two counties were present. Charles O'Neil, secretary-treasurer of The Central Pennsylvania Coal Producers Association, of Pittsburgh, was the speaker of the evening and he brought to the Fayette-Greene operators a message of striking importance. There also were several impromptu talks by members of the Association. G. Carl Areford, president, presided.

The Hampton Roads Coal Association, composed of representatives of practically all coal agencies at Norfolk, established to create better fellowship and improve operating conditions, has been formally organized with a board of directors which has been instructed to choose officers from its own members. The board will elect a president, vice-president, secretary and treasurer. The board members are Lewis Littlepage, Smokeless Fuel Co.; Clayton Wigg, Houston Coal Co.; T. M. Bailey, Virginia Smokeless Coal Co.; T. R. Licklider, Trans-Ocean Coal & Export Co., and Chester B. Koontz, Willard-Sutherland Coal Co.

Obituary

William Andrew Windatt, president of the Windatt Coal Co. of Winnipeg, Man., died on March 5 at the age of 63 years. He was born at Bowmanville, Ont., and came West when a young man. After being for some years engaged in the coal and banking business in Moose Jaw, Port Arthur and Portage la Prairie he settled in Winnipeg in the early 90's and established the business which bears his name. Mr. Windatt also was managing director of the Home Investment Co., and had other large interests including the Foothills Collieries, Ltd. Mr. Windatt had been an invalid for some time and his death was not unexpected. He leaves a widow, two sons and three daughters.

John T. Werry, of Johnstown, died at his home there on March 12, following a long illness from arterio sclerosis. He was born in Cornwall, England, Nov. 11, 1843. He came to America when 18 years of age and settled in Johnstown immediately and entered the coal business, spending most of his time with the Haws Manufacturing Co. He began his work with Andrew J. Haws and for a long time was foreman of the mines. He retired three years ago.

James Meehan, well known in the coal-mining industry in central Pennsylvania, died March 10 at his home in Morrellville (Johnstown) in his 69th year. At the age of 17 he took a job in the mines at Blossburg, Tloga County. It was while he was working in the vicinity of Houtzdale that he received his mine foreman certificate from the same board that examined John Lochrie and "Jack" Hughes, both now in Windber. In 1903 he took charge of Mine No. 35 for the Berwind-White Coal Mining Co., at Windber, and was later associated with the Hastings-Beaver-Spangler interests at Hastings, Spangler and Bakerton. He is survived by two sons, Harry J. Meehan, of Westmont, a coal operator in central and western Pennsylvania, and James A., also of Westmont, and three daughters, all of Johnstown. Burial was at Carrolltown.

William G. Barnhardt, a prominent coal dealer of Kitchener, Ont., died a few days ago of pleuro-pneumonia. He was 54 years of age and was formerly assistant fuel controller.

Coming Meetings

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Fuel Saving Conference, April 2 and 3, William Penn Hotel, Pittsburgh, Pa. Secretary, J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

Canadian Retail Coal Association. Annual meeting, April 3 and 4, King Edward Hotel, Toronto, Ont. Can. Secretary, B. A. Caspell, Brantford, Can.

American Institute of Electrical Engineers. Spring convention, April 7-10, Birmingham, Ala. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

National Coal Association. Annual meeting May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

International Railway Fuel Association. Sixteenth annual convention, May 26-29, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

News Items From Field and Trade

ALABAMA

The Bessemer Coal, Iron & Land Co. has acquired an interest in the Nashville Bridge Co. H. L. Badham, president of the former company, will be added to the directorate of the bridge company, which is about a million dollar corporation, with a subsidiary plant in Bessemer.

The state has leased the Belle Ellen Mines of the Bessemer Coal, Iron & Land Co. on a royalty basis of 35c. per ton on coal removed, the coal to be sold by the state. The object of the new agreement is to get away from the convict leasing system which has been in vogue in the state for many years whereby several of the larger mining companies have been leasing the state and county convicts and employing them in the operation of their mines, and is in the nature of an experiment of several plans which have been under consideration. It is probable that similar contracts will be entered into with the other companies employing convict labor in the coal fields.

The state has leased the Flat Top mine of the Sloss-Sheffield Steel & Iron Co. and will employ its convicts in the operation, furnishing washed coal in cars at \$1.30 per net ton. The tonnage tax will be paid by the owners of the mine. Flat Top mine is one of the largest coal producers in the Birmingham district, the average output being about 2,200 tons daily. Convicts have been employed in this mine since it was opened up, about twenty-two years ago, the company leasing the prisoners at a stipulated rate per month. The new agreement is to take effect July 1, 1924, and is intended as an abolition of the leasing system, against which a bitter campaign has been waged in the state for the past year or more. The product of the mine does not enter the commercial market, being coked in the byproduct plant of the company.

In line with its policy of promoting first-aid and accident-prevention work among its employees, the DeBardeleben Coal Corporation will stage a first-aid contest at Jasper, Ala., March 21, according to announcement of Milton H. Fies, operating vice president of the company. Only employees of the corporation will enter the contests, every mining camp being represented by one or more teams.

Priestly Toulmin, Herbert Tutwiler and associates, of Birmingham, are developing a new mine at Trafford, Jefferson County. Production of around 800 tons per day is contemplated. The operation will be located on the Louisville & Nashville R.R. A washery is being constructed.

The Stith Coal Co. has about completed its 400-ft. shaft at America Junction, Walker County, to reach the Mary Lee seam of coal and is now preparing to install a large washery plant.

INDIANA

Clem J. Richards, receiver for the Sugar Valley Coal Co., of Terre Haute, has been granted permission in Superior Court to sell all the property of the concern.

F. F. Bolinger, cashier of the First National Bank of Shelbyville, was named receiver for the Star City Coal Mining Corporation, Star City, by Judge Walter F. Wood. The receivership was declared on a petition of the National City Bank of Indianapolis, which holds a note for \$18,000 against the company.

KENTUCKY

Several mines in the area of the Kentucky-Tennessee Coal Operators Association in the Hazard and Harlan fields of southeastern Kentucky which were closed down because of inability to agree on wage scales with the representatives of the United Mine Workers, are resuming work. It seems that the men were promised strike benefits, but these have failed to materialize.

Under date of March 8, a press dispatch from Knoxville, Tenn., stated that coal from the Stony Fork Coal Co., L. C. Gunter, president, would move from the

Kentucky mines to the Compressed Coal Co., Savannah, Ga., for use in manufacturing briquets, which will be one of the principal products of the latter company. The report stated that James Imbrie, New York, was associated with Mr. Gunter in the Compressed Coal Co., a \$1,000,000 corporation, formed in West Virginia. Mr. Gunter was formerly president of the Southern Appalachian Coal Operators' Association and is president of the Knoxville & Carolina R.R.

A bill by Senator Tabor has been passed by both houses and signed by Gov. Fields, which will make script, checks, tokens, etc., issued by coal mining companies and other employers, redeemable at face value, and also transferable. The bill was passed in 1922, but was lost before being recorded, and never was signed.

An effort to force the resignation of Lonnie Jackson, president of District 23, United Mine Workers, from the office of Mayor of Central City, failed on the floor of the biennial convention at that town, March 6, the vote being 92 to 21 in favor of his continuing as mayor of the city. A small minority endeavored to show that his duties as mayor were interfering with his work as president of the district union.

Senator Hiram Brock of Harlan, has put a bill through the Kentucky Senate to regulate type of containers used, and amount of explosives which can be taken into Kentucky coal mines at any one time. The bill passed by a 20 to 14 vote.

The Pittsburgh Coal Co., Baskett, of which Alexander Blair is president has changed its name to the Race Creek Coal Co., Inc. The management remains the same.

The Hazard Fuel Co. of Lexington, capital \$50,000, has been chartered by T. F. McConnell, W. J. Raibould and Asa Ewen.

T. C. Miller on March 15 became superintendent with the Elkhorn Coal Corporation at Jackhorn, Letcher County.

MISSOURI

About 15 cars of coal per day are replaced by electric power to be furnished on a contract just signed by the Pittsburgh Plate Glass Co. for its Crystal City plant from the new gigantic Cahokia power plant of the Union Electric Light & Power Co. across the river from St. Louis. The contract calls for total payments of \$600,000 a year for 10 years and is the first big contract signed for the new Cahokia station. The glass company will continue to use coal for its gas producers and yard locomotives.

NEW YORK

A new issue of \$2,500,000 Central Coal & Coke Co. first mortgage 6½ per cent sinking fund gold bonds, closed mortgage, series B and C, at 98, to yield about 6.65 per cent, is being offered. The bonds are dated March 1, 1924, and are due March 1, 1944. The Central Coal & Coke Co. owns and operates extensive timber and coal properties in Oregon, Louisiana, Texas, Missouri, Kansas, Oklahoma and Wyoming. The bonds are the joint and several obligations of the Central Coal & Coke Co. and the Delta Land & Timber Co., a wholly owned subsidiary. Net operating earnings of the Central Coal & Coke Co. and its subsidiaries, not including Oregon-American Lumber Co., for the seven-year period ended Dec. 31, 1923, averaged \$1,033,515.40 or more than 2½ times the maximum annual interest requirements on all outstanding first-mortgage bonds of the company.

The Sunday Creek Coal Co., Columbus, Ohio, announces the opening of a sales office at 872-74-76 Ellcott Square, Buffalo, in charge of J. Fred Motlock.

The Board of Directors of the Lehigh Valley Coal Sales Co. has declared a dividend of \$2 per share payable to stockholders on April 1.

The Island Creek Coal Co., of Boston, has declared an extra dividend of \$1 on the common stock, the regular quarterly dividends of \$2 on the common and \$1.50 on the preferred, payable April 1 to stock of record March 26.

OHIO

The Essex Coal Co., of Columbus, is installing oil-burning boilers at three of its operations in the Hocking Valley field to operate electrical plants. The mines being thus equipped are the Hocking Valley Mining Co., at Hocking; the Kimberly Mining Co., at Nelsonville, and the Ohio Mining Co., at Jackson. At each place two 300-hp. oil-burning boilers are being installed which will operate generators capable of generating about 700 kw. The company is taking advantage of the slack demand in order to make the improvements, which are expected to be completed in a month.

Richard Osborne, general manager for the Borderland Coal Sales Co. for the past year, with headquarters in Cincinnati, has resigned and has opened an office for the Mid-West Coal Co., of Carle, Ill., which will be located in the Union Trust Building, Cincinnati.

The Columbus office of the Pittsburgh Coal Co. started lake shipments late last week from its Ohio and Kentucky mines for transshipment on bottoms tied up in the Toledo harbor. This is expected to relieve the situation to a certain extent as a considerable loading of bottoms will be made to wait for the official opening of the lake season.

W. T. Richardson, vice president of the Universal Coal Co. of Price Hill, W. Va., who directed the firm's Western selling office in Cincinnati, has resigned and has been appointed manager of the Cincinnati office of Dexter & Carpenter, Inc.

The J. R. Fitzer Coal Co., Columbus, which has offices in the Citizens' Trust Bldg., is being operated by John Fitzer, son of the late J. R. Fitzer, under the same name. This company has two very important selling connections.

The Kanawha & Ohio Coal Co., Columbus, of which Sheldon Smith is at the head, has moved its offices from the Arcade Building to the Douglass Building.

The General Electric Co. moved the headquarters of its East Central district from Cincinnati to Cleveland on March 1, according to a recent announcement. In the latter city, combined with the local Cleveland office of the company, it will be located in the new Union Trust Co. building.

OKLAHOMA

The Acme Coal & Coke Co. will build five miles of railway tracks at its strip pit 2½ miles east of Stigler. It now operates three miles of track. This company shipped 123 cars of coal in January, the largest monthly shipment it has made since it began operations in 1920. The product was shipped into eleven states.

PENNSYLVANIA

The Hudson Coal Co., which owns extensive tracts of anthracite land near Mechanicsville, Schuylkill County, has erected drills on Salem Hill, Port Carbon, Schuylkill County, with a view of locating definitely some of the big seams known to exist in that vicinity. It is expected that a colliery employing about 800 men will be erected by that company on the site of the proposed workings and homes and other buildings constructed for the workmen and their families. Many coal companies, operating in Scranton and Wilkes-Barre, are rapidly invading the Schuylkill fields. Incidentally with the announcement of the Hudson Coal Co. the Peach Mountain slope in Schuylkill County, after an idleness of seventy-five years, is again in operation. The independent operators in charge of the colliery found that they can strike a large body of coal containing hundreds of thousands of tons through this slope and had it opened at a great expense. The Peach Mountain slope was one of the many operations abandoned in the Schuylkill region when it was found cheaper to mine the beds in the vicinity of Scranton and Wilkes-Barre.

The merger of the Cosgrove-Meehan Coal Co., located in Johnstown, has received the approval of the state. The capital stock of the merged interests is given as \$315,000. J. E. Graham, of Johnstown, is treasurer. Companies entering the merger are the Homer City Coal Co., Purity Coal Co. and the Grazier Coal Mining Co.

Coal production in the Tenth bituminous district, which includes the mines in Blair and a portion of Cambria county, was 3,230,593 tons in 1923, according to the report of Mine Inspector Joseph Williams, of Altoona.

Approximately 15,000,000 tons of coal, or an increase of 50 per cent over the previous year, was produced in the **Cambria County region during 1923**, according to the annual reports of the state mine inspectors of the four districts of which Cambria county is a part. The number of tons produced per fatal accident in the Sixth district was double that of the previous year, according to State Inspector Thomas D. Williams. The Bethlehem Mines Corporation, a subsidiary of the Bethlehem Steel Corporation, produced 2,101,272 tons, or more than 40 per cent of the coal mined in the Sixth district, in which it is located. An increase of approximately 62½ per cent in coal production over the 1922 figures was recorded in the Thirteenth district, Inspector John I. Thomas reported. Few accidents marred this production record. A total of 4,753,805 tons of coal was produced last year in the Thirtieth district, of which Charles H. Crocker is inspector. This district comprises mines in Cambria, Indiana and Westmoreland counties. Of the amount, 1,514,487 tons was mined in Cambria County.

River coal, or anthracite washed down stream from the mines, valued at \$605,822 was recovered in 1923 from the Susquehanna, Schuylkill and other rivers, according to reports made to Auditor General Samuel S. Lewis for taxing purposes. The coal had an average value of \$1.27 a ton. Sixty corporations, firms and individuals have made reports and they will pay a state tax aggregating \$9,087.33.

The State Supreme Court has affirmed the judgment of the Greene County Common Pleas Court in the case of the Shannopin Coal Co., which appealed from the triennial assessment for 1922, 1923 and 1924. The lower court reduced the valuation. The County Commissioners then appealed the case to the Supreme Court and it was agreed that all appeals taken from assessments of coal lands should abide by the final decree of the higher court in the Shannopin case, and that assessments would be reduced by a like percentage in case the reduction made by the Greene County court should be sustained.

The anthracite producing companies in their reports of 1923, made to Auditor General Samuel S. Lewis, for state coal-tax purposes, indicate a total tax due considerably in excess of the estimated return and \$3,500,000 more than was reported for the year 1922. "An increase in state revenues is shown by the indicated yield from the anthracite coal tax for 1923," Auditor General Lewis said. **The tax reported for 1923 by the anthracite coal operators aggregates \$7,273,788.** A feature of the tax shown by the reports, the period for the filing of which expired recently, is that ten coal companies report eighty per cent of the tax. Two companies reported a tax of nearly \$1,000,000, each, for the year.

The following bituminous coal companies, which will mine and manufacture coke and by-products and all of which have their home offices at Ligonier, were incorporated recently at the State Department at Harrisburg: **Ligonier Diamond Coal Co.** No. 2, capital stock, \$52,000; incorporators, John Seger, W. J. Seger and Joshua Voge. **Seger Brothers Co.**, Ligonier, \$370,000; incorporators, John Seger, Joshua Voge and H. E. Behrhorst. **St. Clair Fuel Co.**, \$136,000; incorporators, John Seger, Mayme Voge and Dora D. Seger. **Seger Brothers Coal Co.**, \$70,000; incorporators, John Seger, Joshua Voge and Jane Crann. **Voge Coal Co.**, \$35,000; incorporators, John Seger, Mayme Voge and H. E. Behrhorst. John Seger, Ligonier, is treasurer of all of the companies.

TENNESSEE

By court decree of Feb. 23, at Nashville, the property operating the past seven months as the Old Hickory Powder Plant Receivers has been restored to the **Nashville Industrial Corporation**.

UTAH

It is planned to provide the first unit of the blast furnace of the **Columbia Steel Corporation** near Provo, in Utah County, with ten cars of iron ore, twenty-five cars of coal, and five cars of limestone a day. The plant will be in operation in a few weeks.

L. F. Rains, president of the Carbon Fuel Co., of Salt Lake City, has been appointed to the production committee of the U. S. Chamber of Commerce.

The capital stock of the **Mutual Coal Co.** has been increased from \$500,000 to \$800,000. The company had not lost a day due to poor market conditions since July 1.

VIRGINIA

The **Amherst Coal Co.** has opened an agency at Norfolk with H. M. Fadeley, formerly with the Low Volatile Consolidated Coal Co., in charge. H. W. Moore, formerly with the Fort Dearborn Coal Co. at Norfolk, also is in the new agency.

E. H. Jarvis, formerly with the Low Volatile Consolidated Coal Co., has become associated with the Smokeless Fuel Co. at Norfolk.

W. K. Moore, of the Houston Coal Co., Norfolk, has gone to Richmond to take a position with the Raleigh Smokeless Fuel Co. **J. B. McClure**, of the Beckley, (W. Va.) office of the latter concern, has gone to the Norfolk office of his company.

WEST VIRGINIA

The No. 2 mine of the **New River & Pocahontas Coal Co.**, on Laurel Creek, in the New River field, which had been in idleness for some time, resumed operations during the first week of March. The company is having 100 new mine cars constructed. This company has not reduced wages, paying the same scale which has been in force for the past two years.

The Supreme Court of West Virginia has held in the case of **R. M. G. Brown** and others against the **American Gas Coal Co.**, appealed from the Circuit Court of Monongalia County, that **federal income taxes constitute a prior lien.** Litigation in this case grew out of the fact that after the Knob Coal Co. had been sold by J. M. G. Brown, Robert D. Hennen and others to the American Gas Coal Co. for \$300,000, on which a cash payment of \$125,000 was made, when there was a default in payment action was brought, charging insolvency and when the case was referred to a master, unpaid income taxes were given a prior claim, such unpaid income taxes amounting to \$35,166.66 plus interest. Brown and his associates filed an exception to the finding of the master and the court sustained such exceptions and gave the trust lien priority, that portion of the decree of the lower court being reversed by the Court of Appeals. The Circuit Court held that federal income taxes did constitute a lien against the property but placed it after other liens on the ground that the federal government had failed to assert and establish its lien for unpaid income taxes.

C. E. Reese, gas and electrical engineer, has been appointed general manager of the Bluefield Gas & Power Co., Bluefield. This is a Sanderson & Porter property. Mr. Reese has been connected with the Westinghouse Electric & Mfg. Co., as section head, stoker sales and publicity department, Philadelphia, Pa. He has been actively engaged in the Stoker Manufacturers Association as secretary of the publicity committee and chairman of the advertising sub-committee. He was formerly combustion engineer with Henry L. Doherty & Co., New York City, and assistant engineer with the Illinois Public Utilities Commission, working in Springfield and Chicago.

The U. S. Circuit court of Appeals at Cincinnati has affirmed the verdict of a lower court at Cleveland in awarding judgment of \$440,000 in favor of the **Main Island Creek Coal Co.** against the **Cleveland & Western Coal Co.**, of Cleveland. There was an arrangement, it is alleged, between the two companies under the terms of which the Cleveland & Western company was required to deliver as much coal at tidewater for the Main Island company as that company delivered at the lakes for the Cleveland concern. The Main Island company in its suit alleged that at the end of the lake season it had shipped about 60,000 tons more than had been delivered for its account.

J. A. Blake has resigned as mining superintendent at the Glen White plant of the **E. E. White Coal Co.**, and has been succeeded by **E. E. Jones**, who has been the superintendent at the Stotesbury plant for some time. Mr. Blake was presented with a gold watch by the company at a farewell function. He also was presented with a gold chain and B. P. O. E. emblem on behalf of the Glen White Mining Institute and the official force of the **E. E. White Coal Co.**

Owing to a falling off of orders, the operators in the Mountain Park coal field, Saskatchewan, are **laying off about 500 men.**

The **New England Fuel & Transportation Co.** of Grant Town, W. Va., has contracted with the **Roberts & Schaefer Co.**, for the installation of a screen and loading booms in its No. 3 tipple, at Lowville.

Carl Scholz, vice-president and general manager of the Raleigh-Wyoming Coal Co., with mines at Edwight, in Raleigh County, and at Glen Rogers, in Wyoming County, has announced the appointment of **Walter Stevens** as general mine superintendent at the **Glen Rogers mine** of the company. The new general mine superintendent at Glen Rogers was associated with Mr. Scholz when the shaft at Valier, Ill., was sunk, that ranking as a record breaking performance, since work was commenced on September 1, 1917 and two shafts 612 feet deep had been sunk by April 1 and coal was being hoisted by the latter date. Mr. Stevens succeeds Edward Nicholson.

All the holdings of the **Macbeth Coal Co.** on Rum Creek in the Logan district of West Virginia, owned in large part by John Laing and associates of Charleston, has been purchased by the **Logan Eagle Collieries Co.**, headed by Walter R. Thurmond, former president of the Logan Operators Association and general manager of the Thurmond Coal Co. and of the Argyle Coal Co. The consideration involved is said to be in excess of \$1,000,000.

The judgment of the Circuit Court of Kanawha County in the case of the **Fayette-Kanawha Coal Co.** against the **Lake & Export Coal Corporation** of Huntington has been reversed by the West Virginia Supreme Court in the suit involving alleged breach of contract. The upper court set aside a verdict of \$50,281 for loss of anticipated profits, but the appeal court in its decision asserted that the possible production of one of the plaintiff's mines, not in operation, should not be considered.

WASHINGTON, D. C.

The Government Fuel Yards opened bids for anthracite and bituminous coal required between April 1 and June 30, 1924. There were 24 bids for supplying 24,600 gross tons of New River or Pocahontas mine run, the price varying from \$2.22 per gross ton, by the Lake & Export Coal Corporation of New York, to \$2.80, by William C. Atwater & Co. Thirty-four companies submitted figures on 10,000 tons of Maryland, Pennsylvania or northern West Virginia mine run, for shipment to the Capitol power plant, on the Pennsylvania R.R., the price range being from \$1.90, by the Valley Camp Coal Co., to \$3.30, by the Iron Trade Products Co.; for supplying 4,500 tons of the same coal for shipment to St. Elizabeth's Hospital, on the B. & O. R.R., 33 companies submitted tenders, the quotations ranging from \$1.80, by the Steamship Fuel Corporation, to \$3.14, by the Iron Trade Products Co. Six companies submitted bids on anthracite.

CANADA

Three recommendations were presented to Acting Finance Minister J. A. Robb and Charles Stewart, Minister of the Interior, by a delegation from the Central Council of Municipal Associations of Ottawa, that all retail merchants should put the analysis of the coal they sell on their invoices, that import duties should be removed from all machinery used in the manufacture of coke and its byproducts and from imported soft coal for conversion into coke; that the sales tax be removed from all byproducts, whether agricultural or chemical, of the manufacture of coke. Both ministers promised that the recommendations would be referred to government fuel experts.

An increase of over a million and a half tons of coal for the year ending September 30, 1923, is recorded in the annual report on the Nova Scotia mines. **The total output was 6,179,890 tons** as compared with 4,537,494 tons for the preceding year. There was an increase in local consumption of over 600,000 tons, while shipments to the St. Lawrence increased by nearly half a million. In his report Premier Armstrong stated that he hoped a scheme might be evolved whereby Nova Scotia coal might yet be coked somewhere on the St. Lawrence, its gas utilized and the coke go west to replace anthracite. He expressed the hope that the waters of the St. Lawrence might be sufficiently deepened so that Nova Scotian coal could reach Ontario and replace American bituminous coal and by semicoking replace the anthracite now imported from the United States.

Recently coal operators in the Edmonton field of central Alberta have been shipping coal by the **Canadian National Ry. to Port Mann**, and thence to Seattle. There seems to be reasonable hope that a good business will be developed by the mine operators with Puget Sound ports.

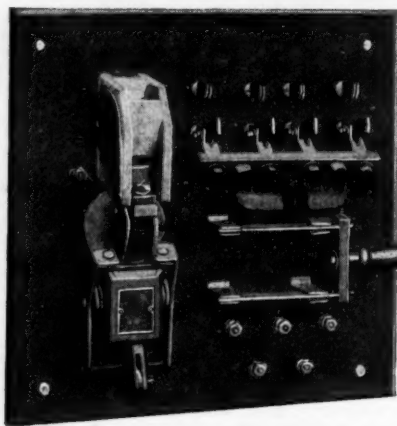
New Equipment

Oil Circuit Breakers with New Automatic Features

A line of indoor service electrically operated oil circuit breakers, in which are incorporated several new and distinctive features has been developed by the Westinghouse Electric & Manufacturing Co. These breakers are three-pole, single-throw, either non-automatic or automatic in operation, for capacities up to 2,000 amperes and alternating current voltages up to 25,000 with interrupting capacities rated at approximately 9,500 volts and 13,000 amperes respectively. They are particularly adapted to the control of alternating-current circuits of large capacity where the voltage does not exceed 25,000 volts. Each of the two forms has a different maximum interrupting capacity but the details of construction are similar.

The two outstanding features in the construction of this type of breaker are its compactness and its ease of installation. No intermediate structure walls are required for supporting the individual poles; all of them are supported from the common steel top. The breaker is supported by means of anchor-plates set in and projecting from the cell walls. The steel top of the breaker, which rests on these plates, is bolted securely in place. Where space is of prime importance, a saving of almost 6 in. per three-pole breaker can be made in length of cell structure by the use of steel compartments instead of concrete compartments. The space between the breaker top and the floor, in front of the tanks, is covered with removable doors, each consisting of a metal frame with asbestos panels and hinged at the top.

The oil tanks of the CO breakers are



Control Relay Makes Tripping Completely Automatic

The operation of the release coil of the control relay is designed to trip the breaker irrespective of the fact that the operator may be holding the control switch in the closed position.

seamless and die-pressed from heavy sheet steel. They are so fastened to the steel top that an oil-tight joint is secured. Each tank is equipped with a muffler, so that when the breaker opens a heavy short circuit, the air in the top chamber is forced out through the muffler in advance of the arc gases rising through the oil. This eliminates the possibility of a violent explosion in the breaker structure from the mixture of oxygen and arc gases. The rupturing capacity and the severity of the duty cycle which a given breaker structure will handle are thereby greatly increased. To prevent arcing between contacts and tanks, a set of removable flame-resisting insulating linings is used in each tank. The inner layers

of these linings are of asbestos; the outer layers, of micarta. Oil gages indicate the level in each tank.

The breaker is operated by a unit type solenoid mechanism mounted above the poles on the top of the steel bed plate forming the cell top. After the breaker is closed by the solenoid, it is held in the closed position by a hardened steel latch which in turn automatically engages with a trigger. The oil circuit breaker is equipped with a special control relay panel which is provided with a two-piece contact arm and release coil. As soon as the circuit breaker is closed by the operator in the usual manner, the pallet switch on the breaker energizes the release coil of the control relay. This release coil opens the contact of the control relay, irrespective of the fact that the operator may hold the control switch in the closed position. By the use of this special control relay, full automatic protection can be secured where the breaker is used in connection with overload relays and current transformers.

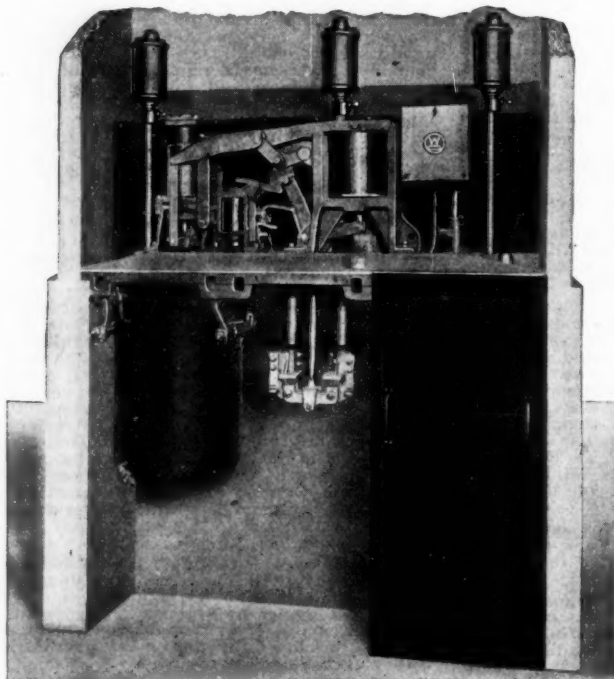
Electric Capstan Car Puller

The Silent Hoist Co., of Brooklyn, N. Y., has developed a car puller which they claim is powerful, compact, waterproof, dirt-proof and fool-proof. When used for placing cars, one end of a manila rope is hooked to the car and a few turns are made around the capstan head. When the free end of the rope is gently pulled the cars may be easily placed wherever desired.

The equipment consists of a Silent Hoist vertical capstan winch driven by an electric motor, or a gas engine. This equipment is all mounted on a self-contained fabricated steel I-beam base. The capstan is driven through a self-locking, non-reversible, worm gear drive consisting of a phosphor-bronze worm-wheel meshing with a nickel-steel hardened, ground, and polished worm. All thrust is taken by a ball bearing and the entire gear drive is inclosed in a gear case.

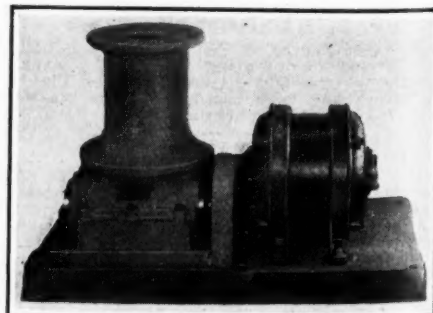
The entire machine is unusually compact, taking up a space of 22 in. by 44 in. The shipping weight of the unit complete with an alternating-current motor is about 750 lb., and with a direct-current motor the weight is approximately 950 lb.

The Model T-5 car puller has a rope pull of 5,000 lb. at 25 ft. per minute and will easily pull two average loaded railroad cars.



Oil Circuit Breaker

A 1,200-ampere, 25,000-volt, three-pole automatic circuit breaker with doors removed from two units and tank removed from one unit, showing heavy contact construction.



Hoist for Car Placing

This little hoist can be fitted either with an electric motor or gasoline engine and is especially suitable for spotting cars under the coal chutes.